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Title. Dissemination of evidence in pediatric emergency medicine: a quantitative descriptive evaluation of a 16-week social media promotion

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ABSTRACT

Objectives. TRanslating Emergency Knowledge for Kids (TREKK) and Cochrane Child Health collaborate to develop knowledge products on pediatric emergency medicine topics. Via a targeted social media promotion, we aimed to increase user interaction with the TREKK and Cochrane Child Health Twitter accounts, and the uptake of TREKK Bottom Line Recommendations (BLRs) and Cochrane systematic reviews (SRs).

Design. Quantitative descriptive evaluation.

Setting. We undertook this study and collected data via the Internet.

Participants. Our target users included online healthcare providers and health consumers.

Intervention. For 16 weeks we used Twitter accounts (@TREKKca and @Cochrane_Child) and the Cochrane Child Health blog to promote 6 TREKK BLRs and 16 related Cochrane SRs. We published 1 blog post and 98 image-based tweets per week.

Primary and secondary outcome measures. The primary outcome was user interaction with the TREKK and Cochrane Child Health Twitter accounts. Secondary outcomes were visits to TREKK's website and the Cochrane Child Health blog, clicks to and views of the TREKK BLRs, and alternative metric scores and downloads of Cochrane SRs.

Results. Followers to the @TREKKca and @Cochrane_Child increased by 24% and 15%, respectively. Monthly users of TREKK's website increased by 29%. Clicks to the TREKK BLRs increased by 22%. The BLRs accrued 59% more views compared to the baseline period. The 16 blog posts accrued 28% more views compared to the eight previous months when no new posts were published. The alternative metric scores for the Cochrane SRs increased by ≥10 points each. The mean (SD) number of full text downloads for the promotion period was 4 (22)% more compared to the 16-week average for the previous year.

Conclusions. There was increased traffic to TREKK knowledge products and Cochrane SRs during the social media promotion. Quantitative evidence supports blogging and tweeting as dissemination strategies for evidence-based knowledge products.

Keywords: social media, Twitter, blogs, emergency medicine, pediatrics, knowledge dissemination, knowledge translation, knowledge synthesis, systematic reviews

STRENGTHS AND LIMITATIONS OF THIS STUDY

- We undertook a carefully planned social media promotion using multiple platforms (Twitter accounts and blogs), allowing us to reach a broad and diverse audience.
- As there is no guidance as to how to evaluate social media promotions, and few evaluations have been published, our results cannot be generalised.
- In the absence of guidance, we based our a priori goals on historical measures of performance, and selected quantitative social media metrics to measure their achievement.
- Our study design does not allow us to conclude with certainty that the changes observed were attributable to our promotion.

BACKGROUND

There is an evidence-to-practice gap in children's emergency care in the United States and Canada. While most children are cared for in non-specialty, general emergency departments,[1,2] these settings are often under-resourced in pediatric expertise and equipment.[2,3] As a result, many children fail to receive standard evidence-based treatments for common health conditions.[4] In some cases children may be provided with treatments that are ineffective or have the potential to pose harm.[5] Targeted knowledge translation strategies can contribute to improving pediatric emergency care by increasing healthcare providers' (HCPs') awareness, knowledge, and application of evidence-based guidance.

Social media platforms are a convenient means to disseminate evidence-based health information. Among other venues, freely accessible platforms like Twitter and Facebook are increasingly being used by HCPs and patients to seek out information and communicate online.[6,7] Along with advances in the use of social media in healthcare settings, free open-access medical education (FOAM) has grown rapidly in the past decade.[8,9] As part of the FOAM movement, HCPs can create free and openly available educational resources which may then be rapidly disseminated through social media to colleagues and trainees.[8] Sharing evidence-based resources on social media platforms may also improve patient and public access to high quality health information.[10,11]

TRanslating Emergency Knowledge for Kids (TREKK, http://trekk.ca) is a Canadian knowledge mobilisation initiative driven by a network of researchers, HCPs, and consumers committed to increasing the uptake of high-quality pediatric emergency medicine evidence.[12,13] TREKK creates open-access, evidence-based knowledge products to address the information and education needs of HCPs. These include: an Evidence Repository populated with expert-selected guidelines, Cochrane systematic reviews, and other key studies; and Bottom Line Recommendations (BLRs) that provide summaries of key facts and recommendations for the diagnosis and treatment of acute childhood conditions.[12,13]

TREKK collaborates with Cochrane Child Health (http://childhealth.cochrane.org/) by highlighting Cochrane evidence on pediatric emergency medicine topics within its knowledge products. Cochrane systematic reviews bring together all available research on healthcare interventions, providing the best evidence for informed clinical decision-making. Specific to pediatric healthcare, Cochrane Child Health works with Cochrane to advocate for systematic reviews that reflect the needs of children, facilitate systematic reviews on child health topics, develop methods for synthesizing child-relevant health research, and translate Cochrane knowledge to relevant stakeholders.[14]

TREKK's Twitter account (@TREKKca) was established in December 2011. Although TREKK aims to serve Canadian HCPs and families, much of the content disseminated via its Twitter account is universally relevant. The Cochrane Child Health Twitter account (@Cochrane_Child) was established in September 2013 and aims to serve an international audience of researchers and HCPs. The Cochrane Child Health blog (https://cochranechild.wordpress.com/), established in November 2014, aims to translate child-relevant Cochrane evidence to HCPs and families. Both Twitter accounts and the blog are managed out of the Alberta Research Centre for Health Evidence (ARCHE), University of Alberta, Canada.

We used social media to disseminate and promote the uptake of TREKK knowledge products and Cochrane systematic reviews on pediatric emergency medicine topics. Via a 16-week promotion, we aimed to increase: 1. user interaction with the TREKK and Cochrane Child Health Twitter accounts; 2. visits to the TREKK website and clicks to and views of TREKK BLRs; and 3. visits to the Cochrane Child Health blog and alternative metric scores and downloads for the Cochrane systematic reviews.

METHODS

Promotion Summary

We ran a 16-week social media promotion from September 5 to December 25, 2016 using blog posts and tweets. Our primary audience for the promotion was HCPs and trainees. Our secondary audience was health consumers providing care to children (parents, families). The promotion followed an a priori protocol, available upon request. In addition to our overarching objectives, we decided on specific goals that we aimed to achieve by the end of the promotion (**Box 1**).

Box 1. Specific goals for the social media promotion

1. Increase followers of the TREKK and Cochrane Child Health Twitter accounts by 15%.
2. Increase site visits to the TREKK website by 10%.
3. Increase clicks to the TREKK BLRs by 10% for the first promotional week, and by 5% in each additional week.
4. Increase site visits to the Cochrane Child Health blog to 6,077 views.[1]
5. Increase alternative metric (http://altmetric.com) scores for the promoted Cochrane systematic reviews by 10 points each.

[1]Based on performance from 2013 to 2015, we anticipated 289 views for each new post.

Table 1 shows our weekly promotion schedule. TREKK's national needs assessment informed the topics that we selected. As part of the needs assessment, 1,471 HCPs from 32 Canadian general emergency

departments completed surveys on the pediatric emergency medicine topics for which information for evidence-based care would be of interest.[13,15] From the priority list of topics from the survey, we selected those where the TREKK Evidence Repository contained a relevant Cochrane systematic review (croup, fractures, gastroenteritis, intussusception, multisystem trauma, and procedural pain). This allowed us to promote TREKK's knowledge products and Cochrane Child Health evidence concurrently.

Table 1. Detailed weekly social media promotion schedule

Week	TREKK BLR	Cochrane systematic review
September 5-11	Multisystem Trauma	Thromboprophylaxis for trauma patients
September 12-18	Fractures	Surgical interventions for diaphyseal fractures of the radius and ulna in children
September 19-25	Multisystem Trauma	Prophylactic antibiotics for penetrating abdominal trauma
September 26-October 2	Croup	Nebulized epinephrine for croup in children
October 3-9	Multisystem Trauma	Selective computed tomography (CT) versus routine thoracoabdominal CT for high-energy blunt-trauma patients
October 10-16	Fractures	Antibiotics for preventing infection in open limb fractures
October 17-23	Intussusception	Vaccines for preventing rotavirus diarrhoea: vaccines in use
October 24-30	Multisystem Trauma	Non-operative versus operative treatment for blunt pancreatic trauma in children
October 31-November 6	Multisystem Trauma	Antifibrinolytic drugs for acute traumatic injury
November 7-13	Gastroenteritis	Oral versus intravenous rehydration for treating dehydration due to gastroenteritis in children
November 14-20	Procedural Pain	Psychological interventions for needle-related procedural pain and distress in children and adolescents
November 21-27	Gastroenteritis	Antiemetics for reducing vomiting related to acute gastroenteritis in children and adolescents
November 28-December 4	Multisystem Trauma	Emergency ultrasound-based algorithms for diagnosing blunt abdominal trauma
December 5-11	Croup	Glucocorticoids for croup
December 12-18	Fractures	Interventions for treating femoral shaft fractures in children and adolescents
December 19-25	Croup	Heliox for croup in children

BLR: Bottom Line Recommendation

Blog Posts

Throughout the promotion, we published posts on the Cochrane Child Health blog. We published an introductory blog post during the week of August 29, 2016 that briefly described our promotion. Subsequently, we posted one blog post per week. Each blog post contained: the plain language summary for a Cochrane systematic review, published with permission from Wiley; a "blog shot" image

(image-based summary containing three key messages from the Cochrane systematic review); and citations and traceable links to TREKK knowledge products (Evidence Repository and BLRs) and the full text of the Cochrane systematic review. **Supplementary File 1** includes sample blog shot images.

Tweets

We published 98 tweets per week from four Twitter accounts: @TREKKca, @Cochrane_Child, @arche4evidence (ARCHE), and @TRIPChildHealth (Turning Research Into Practice (TRIP) database for high quality clinical research). These tweets included traceable links to the relevant TREKK knowledge products, the Cochrane systematic review, and the Cochrane Child Health blog.

We used Buffer (https://buffer.com) to pre-schedule the tweets for publication at peak-traffic times for all Twitter accounts. We included images in each tweet. These included the aforementioned blog shots, as well as images modified from files supplied by Cochrane UK, ShutterStock, the TREKK knowledge products development team, and other websites containing public domain images (e.g., Wikimedia Commons, thenounproject.com). We also used the Pablo image editor in Buffer (https://pablo.buffer.com/) to create images to promote the Cochrane systematic reviews. During weeks when sensitive topics were covered (e.g., multisystem trauma), we used general emergency medicine images (e.g., ambulances, medical equipment) as to inform our audience without posing undue discomfort. **Supplementary File 2** shows samples of our image-based tweets.

Audience Engagement

During the week of August 29, 2016, we e-mailed the corresponding authors and the Cochrane Review Groups (who manage the editorial processes associated with the production and publication of Cochrane systematic reviews) for each of the 16 Cochrane systematic reviews that we planned to promote. We informed them of our intention to promote their review via social media, provided the dates of the promotion, and encouraged them to check the Cochrane Child Health Twitter account and retweet our messages. We invited the corresponding authors to provide key messages for the blog. We also contacted TREKK content advisers and shared our intention to promote the TREKK knowledge products and Cochrane systematic reviews. We invited them to retweet our messages and provide a quote as to the value of the selected Cochrane systematic review and of their BLR for HCPs.

During the promotion, members of our team (RF, EH) monitored the Twitter accounts and replied to comments about the promoted content. Through our replies, we aimed to promote further engagement

with TREKK and Cochrane Child Health. We did not dispense clinical information but committed to sharing the feedback with our team.

Patient Involvement

Patients were not involved in the development of the research questions, choice of outcome measures, nor in the design and conduct of this study. We will disseminate our findings via presentations at academic conferences and messages from the four Twitter accounts.

Data Collection

Throughout the promotion, we collected indicators of engagement with our Twitter accounts, the uptake of TREKK BLRs and Cochrane systematic reviews, and visits to the TREKK website and Cochrane Child Health blog. We stored the data in a Microsoft Office Excel (v. 2016, Microsoft Corporation, Redmond, WA) workbook.

On August 15, 2016, we recorded the baseline Twitter followers for the @Cochrane_Child and @TREKKca accounts. One week following the completion of the promotion, we again recorded the total followers at each account. To measure user interaction with our accounts, each week during the promotion we collected metrics from the Twitter activity dashboard. These included the number of retweets (times a user retweeted our tweet), favourites (times a user favourited our tweet), impressions (times a user followed our accounts directly from a tweet), and engagements (times a user interacted with our tweet, i.e., clicked anywhere on the tweet, including retweets, replies, follows, likes, links, cards, hashtags, embedded media, username, profile photo, or tweet expansion).[16]

At baseline (average for the months of July and August 2016) and following the promotion (December 25, 2016), we collected the number of site visits to http://trekk.ca, measured by the number of sessions, page views, and users via Google Analytics (http://www.google.com/analytics/) reports. We collected the number of clicks to the TREKK BLRs using the @arche4evidence bit.ly (https://bitly.com) account. We collected click count data at baseline (August 15, 2016), and 30 days after the links to the BLRs were created (beginning on October 5, 2016 and weekly until February 1, 2017). We also collected the number of BLR document views at baseline (for the 16-week period before the promotion) and during the promotion period via reports produced by http://trekk.ca.

We collected the number of site visits to the Cochrane Child Health blog for the three years prior to the promotion, at baseline (year-to-date on August 15, 2016), and following the promotion (January 3,

2017) via information provided by WordPress (http://wordpress.com). We recorded alternative metric scores provided by http://altmetric.com for each of the systematic reviews at baseline (August 15, 2016) and at the end of the promotion (December 25, 2016). Alternative metrics are non-traditional metrics that complement traditional citation impact metrics like the Impact Factor.[17] The score provided by altmetric.com is a composite measure of an article's dissemination (i.e., readership), whereby more popular (or "buzzworthy") articles are scored more highly.[18] Following the promotion, Wiley (the publisher for Cochrane systematic reviews) provided full text download data for the period of September 2015 to January 2017 for each of the systematic reviews that we promoted.

Data Analysis

We calculated descriptive statistics in Excel. We calculated the increase in Twitter followers by subtracting the baseline followers from the total followers at the end of the promotion for each account, and calculated the percent increase. We calculated the total and mean (standard deviation [SD]) retweets, favourites, impressions, and engagements per week, per topic, and overall for each account. We calculated the total users, sessions, and page views for the TREKK website for each promotion month, and the monthly average (SD). We calculated the total clicks to and views of the BLRs, and the percent increase in clicks and views from baseline, by topic and overall. We calculated the percent increase in visits to the Cochrane Child Health blog during the campaign compared to baseline. We calculated the point increase and percent increase in alternative metric scores, and percent change in the number of full text downloads for each Cochrane systematic review compared to baseline. We compared all metrics to our a priori goals to determine which we had achieved.

RESULTS

User Interactions with @TREKKca and @Cochrane_Child

At baseline, the @TREKKca and @Cochrane_Child Twitter accounts had 633 and 1,934 followers, respectively. During the promotion, the @TREKKca account gained 149 followers (23.5% increase) to a total 782 followers. The @Cochrane_Child account gained 283 followers (14.6% increase) to a total 2,217 followers. We met our goal of increasing followers to each account by 15%.

Table 2 shows user interactions with each Twitter account, stratified by topic. Detailed weekly interaction data are available in **Supplementary File 3**. During the campaign, the @TREKKca account received a mean (SD) of 36 (13) retweets, 28 (8) favourites, 12,005 (2,843) impressions, and 261 (88)

engagements per week. The @Cochrane_Child account received a mean (SD) of 56 (35) retweets, 37 (20) favourites, 17,073 (4,560) impressions, and 382 (209) engagements per week.

TREKK Website and Knowledge Products

Table 3 shows the monthly site visits to the TREKK website. During the months of July and August 2016 (baseline), the TREKK website logged a mean of 893 users, 1,378 sessions, and 4,642 page views per month. During the promotion, the website logged a total of 4,608 users, 6,955 sessions, and 19,090 page views. This equated to a mean (SD) of 1,152 (151) users, 1,739 (217) sessions, and 4,773 (688) page views per month. On average, there were 29% more users, 26% more sessions, and 2.8% more page views per month during the promotion than at baseline. We surpassed our goal of increasing site visits to the website by 10% based on the number of users and sessions, but not on number of page views.

Table 4 shows the clicks to and views of the TREKK BLRs. At baseline (August 15, 2016), there were 1,429 clicks to the BLRs. During the promotion, the total number of clicks increased to 1,746 (317 click increase, 22.2%). For the 16-week period before the promotion (baseline), the BLRs were viewed 574 times. During the promotion, the BLRs accrued 915 views (314 [59.4%] more than baseline). There were more views during the promotion than during the baseline period for all of the BLRs (range, 23.3 to 116.0% more). We achieved our goal of increasing the clicks to all of the BLRs by 10% for the first promotional week, and 5% for each additional week promoted, except for those on croup and multisystem trauma.

Cochrane Child Health Blog and Cochrane Systematic Reviews

In the three years before the campaign (2013 to 2015), there were a total of 38 posts to the Cochrane Child Health Blog, and 8,625 site views (108, 1,192, and 7,325 views, respectively). From January 1 to August 15, 2016 there were no new posts and 1,453 site views. During the campaign, we published 17 new blog posts. The blog accrued 1,856 new views, to a total 3,309 views for the year 2016. We did not achieve our goal of increasing the number of views to the blog to 6,077 (289 views for each new post, based on performance from 2013 to 2015).

Table 5 shows the alternative metric scores and downloads for the Cochrane systematic reviews. The alternative metric scores for all of the promoted Cochrane systematic reviews increased during the campaign. The mean (SD) point increase was 16.7 (5.1). We achieved our goal of increasing the alternative metric scores for the Cochrane systematic reviews by 10 points each. Compared to the mean number of downloads during a 16-week period for the year before the promotion (baseline), the total

downloads for the Cochrane systematic reviews did not consistently increase during the promotion, and decreased for seven of 16 (44%) reviews. Compared to the baseline download rate, there was a mean (SD) 4.0 (22.0)% increase in the number of times the promoted Cochrane systematic reviews were downloaded.

Table 2. User interaction with the @TREKKca and @Cochrane_Child Twitter accounts, stratified by topic

Topic	Weeks promoted	@TREKKca, N total (N/week)[1]				@Cochrane_Child, N total (N/week)[1]			
		Retweets	Favourites	Impressions	Engagements	Retweets	Favourites	Impressions	Engagements
Croup	3	146 (49)	96 (32)	42,805 (14,268)	916 (305)	230 (77)	149 (50)	60,230 (20,077)	1,571 (524)
Fractures	3	87 (29)	66 (22)	33,260 (11,087)	659 (220)	125 (42)	94 (31)	52,172 (17,391)	986 (329)
Gastroenteritis	2	89 (45)	66 (33)	25,938 (12,969)	594 (297)	185 (93)	109 (55)	42,472 (21,236)	1,335 (668)
Intussusception	1	26 (26)	24 (24)	11,821 (11,821)	183 (183)	89 (89)	43 (43)	19,181 (19,181)	408 (408)
Multisystem Trauma	6	177 (30)	152 (25)	61,020 (10,170)	1,408 (235)	156 (26)	124 (21)	75,362 (12,560)	1,182 (197)
Procedural Pain	1	44 (44)	42 (42)	17,230 (17,230)	420 (420)	109 (109)	74 (74)	23,756 (23,756)	622 (622)
Total	16	569 (36)	446 (28)	192,074 (12,005)	4,180 (261)	894 (56)	593 (37)	273,173 (17,073)	6,104 (382)

[1]We based the weekly interactions on the total number of weeks that we promoted the topic.

Table 3. Overall monthly site visits to the TREKK website (trekk.ca)

Time point	Users		Sessions		Page views	
	Goal[1]	Actual	Goal[1]	Actual	Goal[1]	Actual
Baseline[2]	-	893	-	1,378	-	4,642
September 2016	982	1,004	1,516	1,512	5,106	4,082
October 2016	982	1,133	1,516	1,736	5,106	4,795
November 2016	982	1,362	1,516	2,031	5,106	5,707
December 2016	982	1,109	1,516	1,676	5,106	4,506
Total	3,928	4,608	6,064	6,955	20,424	19,090
Mean ±SD	-	1,152 ±151	-	1,739 ±217	-	4,773 ±688

SD: standard deviation; TREKK: TRanslating Emergency Knowledge for Kids

[1]We aimed to increase the total monthly users, sessions, and page views for the website by 10%.

[2]Average values for the months of July and August 2016.

Table 4. Clicks to and document views of the TREKK Bottom Line Recommendations, stratified by topic

BLR topic	Weeks promoted	Clicks,[1] N total				Document views,[2] N total		
		Baseline	Goal[3]	Total clicks (N/week)	Percent increase	Baseline	Total views (N/week)	Percent increase
Croup	3	438	526	489 (163)	11.6%	155	265 (88)	71.0%
Fractures	3	386	463	478 (159)	23.8%	176	217 (72)	23.3%
Gastroenteritis	2	298	343	386 (193)	29.5%	106	229 (115)	116.0%
Intussusception	1	150	165	186 (186)	24.0%	63	90 (90)	42.9%
Multisystem Trauma	6	157	212	207 (35)	31.8%	74	114 (19)	54.1%
Total[4]	15	1,429	1,709	1,746 (116)	22.2%	574	915 (61)	59.4%

BLR: Bottom Line Recommendation; TREKK: TRanslating Emergency Knowledge for Kids

[1]Clicks on bit.ly links. We collected baseline data on August 15, 2016.

[2]Based on TREKK.ca analytics. We collected baseline data for the period 16 weeks before the promotion.

[3]We aimed to increase the number of clicks to the TREKK Bottom Line Recommendations by 10% for the first week that we promoted it, and 5% for each additional week (i.e., 20% for three weeks of promotion).

[4]The Bottom Line Recommendation for procedural pain was published in October 2016, so we had no baseline data for this topic and did not include it in the calculation of the totals. We promoted the Bottom Line Recommendation for procedural pain for one week and it received 105 views over the promotion period.

Table 5. Alternative metric scores and full text downloads for the promoted Cochrane systematic reviews

Week	Cochrane systematic review	Alternative metric score, points				Full text downloads, N total		
		Baseline[1]	Goal[2]	Final	Point increase (%)	Baseline[3]	Final	Percent change
1	Thromboprophylaxis for trauma patients	6	16	21	15 (250.0)	426	385	-9.5%
2	Surgical interventions for diaphyseal fractures of the radius and ulna in children	0	10	13	13 (130.0)	79	82	+4.1%
3	Prophylactic antibiotics for penetrating abdominal trauma	14	24	25	11 (78.6)	136	119	-12.7%
4	Nebulized epinephrine for croup in children	33	43	53	20 (60.6)	612	595	-2.8%
5	Selective computed tomography (CT) versus routine thoracoabdominal CT for high-energy blunt-trauma patients	0	10	10	10 (100.0)	128	149	+16.7%
6	Antibiotics for preventing infection in open limb fractures	4	14	18	14 (350.0)	263	252	-4.1%
7	Vaccines for preventing rotavirus diarrhoea: vaccines in use	36	46	54	18 (50.0)	406	386	-5.0%
8	Non-operative versus operative treatment for blunt pancreatic trauma in children	2	12	16	14 (700.0)	82	93	+14.1%
9	Antifibrinolytic drugs for acute traumatic injury	49	59	63	14 (28.6)	596	484	-18.8%
10	Oral versus intravenous rehydration for treating dehydration due to gastroenteritis in children	14	24	36	22 (157.1)	345	492	+42.6%
11[4]	Psychological interventions for needle-related procedural pain and distress in children and adolescents	-	-	109	-	910	999	+9.8%
12	Antiemetics for reducing vomiting related to acute gastroenteritis in children and adolescents	42	52	62	20 (47.6)	443	685	+54.6%
13	Emergency ultrasound-based algorithms for diagnosing blunt abdominal trauma	3	13	23	20 (666.7)	557	350	-37.2%
14	Glucocorticoids for croup	16	26	46	30 (187.5)	777	795	+2.3%
15	Interventions for treating femoral shaft fractures in children and adolescents	4	14	17	13 (325.0)	222	245	+10.4%
16	Heliox for croup in children	16	26	32	16 (100.0)	250	251	+0.2%
Mean ±SD		-	-	-	16.7 ±5.1 (215.4 ±214.0)	-	-	+4.0 (22.0)%

[1]Baseline altmetric.com scores were collected for each Cochrane systematic review on August 15, 2016.

[2]We aimed to increase the altmetric.com scores for each Cochrane systematic review that we promoted by 10 points.

[3]We calculated the average weekly downloads from the previous year (52 weeks), and multiplied this by 16 to obtain the average number of downloads for a 16 week period in the year prior to the promotion.

[4]We did not originally plan to promote this Cochrane systematic review, so we did not collect the baseline altmetric.com score. We replaced the systematic review that we originally planned to promote following a request from the knowledge products development team.

DISCUSSION

Using Twitter and blogs, we aimed to disseminate and promote the uptake of TREKK knowledge products and Cochrane systematic reviews on pediatric emergency medicine topics. Although our study design precludes inferring causation, during the campaign period we successfully increased the number of followers to the TREKK and Cochrane Child Health Twitter accounts by a respective 24% and 15%. We also observed increased traffic to the TREKK website, and a 22% increase in clicks to, and 59% increase in views of the TREKK BLRs. Although full text downloads of the Cochrane systematic reviews did not universally increase, the alternative metric scores increased by at least 10 points for each review. Despite not meeting our target views for the Cochrane Child Health blog, monthly traffic to the site was 1.5 times greater during the promotion compared to the previous eight months during which we had published no new posts.

Common barriers to the adherence to evidence-based guidelines in medical practice include inadequate knowledge of the guideline, attitudes (e.g., lack of motivation or self-efficacy), and behavioural factors (e.g., patient preferences, organisational constraints).[19] With respect to knowledge, especially for conditions where new evidence is accumulating quickly, keeping up with the latest guidance can be overwhelming or impossible.[20,21] Moreover, as not all published research is freely available,[22] the latest evidence may not be accessible by all HCPs. The rapid and continued growth of FOAM represents one important step toward reducing evidence-to-practice gaps in medicine by supporting free access to a dynamic collection of tools and resources for continuing education.[23] Just as HCPs are interested in keeping informed, author groups and organisations are seeking practical means to expand the visibility and uptake of their research and knowledge products. Our data suggest that targeted social media promotions can successfully drive traffic toward websites and products that support evidence-based practices.

Knowledge of the facets of effective social media messages will help to guide the planning and implementation of successful promotions. As many investigations of text-only tweets already exist,[24] our study is novel in that we committed to including custom images that supported the messages in all of our tweets. Ibrahim et al. (2017) designed a prospective, case-control crossover study whereby academic research articles were promoted using text-based tweets as well as tweets containing visual abstracts.[25] Compared to the text-based tweets, those that contained visual abstracts were retweeted 8.4 times more often ($p<0.001$) and received 7.7 times as many impressions ($p<0.001$).[25] Even when images are unrelated to the posted content, their simple presence can entice users to read the

accompanying tweet.[24] Nevertheless, real-life prospective evaluations comparing tweets of various content (e.g., text, images, videos) are few, so how to best structure a tweet aimed at disseminating knowledge products is not well known. Algorithms are being developed with the goal of predicting the popularity and lifespan of tweets.[26-28] These may provide some insight into the components of effective promotional messages.

Interestingly, despite marked increases in Twitter followers and in views of our knowledge products, full text downloads of the Cochrane systematic reviews remained relatively unchanged overall, and even decreased for some reviews. Because we did not have access to page view data, we relied on full text downloads to estimate the uptake (i.e., number of reads) of the reviews. However, Cochrane systematic reviews are long and their statistical findings can be difficult to understand.[29] Moreover, HCPs typically spend only two minutes pursuing answers to healthcare questions,[30] and when reading published research, many do not read the full study and some read only the abstract.[31] The addition of Summary of Findings tables (which summarise the findings of the reviews in a user-friendly format) to Cochrane systematic reviews reduced the time to answer clinical questions from 1.5 to 4.0 minutes to 1.3 to 2.1 minutes, and increased HCPs' and researchers' understanding of the key findings.[29] It is plausible that HCPs accessed only the abstract and Summary of Findings tables and did not download the full text of the review. It is also possible that our followers preferentially viewed our knowledge products. Being concise and easy to understand, they may have been more appealing to busy HCPs compared to the Cochrane systematic reviews that informed them.

Despite the growing popularity of FOAM, one of the most common criticisms is that of quality control.[23,32] To the same degree that social media allow evidence-based materials to be widely and rapidly disseminated, misinformed messages and fallacious materials can also propagate quickly. The onus is mainly on the knowledge users to decipher the quality of online health information. A number of scoring tools have been developed to measure the quality of Internet-based resources for patients and clinicians,[33,34] but their use in practice is uncommon.[35] More often, individuals use visual cues to rapidly appraise the credibility of online sources, including reputation, endorsement, consistency, self-confirmation, expectancy violation, and persuasive intent.[35,36] Visual cues, however, are not always reliable indicators of credibility (e.g., "unpopular" tweets can contain credible content).[35] In our promotion, we included our logos (TREKK and Cochrane) on the tweeted images, cited full text materials in our blog posts,[23] and tweeted from reputable accounts to establish credibility. It would be

interesting in future studies to investigate how these visual cues of credibility impact the uptake of knowledge products disseminated on social media.

Implications for Research and Practice

Many organisations use social media to improve the reach and uptake of their work, but less often is the impact of targeted promotions quantitatively measured and reported on. The challenge for organisations who want to undertake evaluations of social media for knowledge dissemination in health is that, to our knowledge, no guidelines exist on how to set goals, what is reasonable to achieve, or what should be considered "successful". Before starting our promotion, our team developed specific goals and decided on quantitative social media metrics to measure their achievement. In the absence of guidance, we based our goals on the historical measures of performance for the Twitter accounts, blog, TREKK website, and knowledge products. Comparing our goals to our outcomes allowed us to identify which strategies worked best and which could be improved. Guiding principles that help organisations undertake informed evaluations of their social media promotions need to be developed. Reporting on these evaluations will help inform best practices in social media dissemination of evidence-based health materials.

Our aim to promote TREKK's knowledge products and Cochrane Child Health evidence concurrently presented challenges. Sometimes, the focus of the knowledge product and of the Cochrane systematic review did not align as well as we would have liked. Other times, the only suitable review was either out-of-date or empty (contained no included studies). Based on the lessons learned for our promotion, we recommend that organisations who wish to undertake a social media promotion begin with a clear and focused purpose, and carefully plan the content that they wish to promote and define their intended audience a priori.

CONCLUSIONS

There was increased traffic to TREKK knowledge products and Cochrane systematic reviews during our social media promotion. Social media represent an appealing means to disseminating and promoting health knowledge products, thanks to the potential for a broad reach. Nevertheless, it is not entirely clear how social media messages should be structured to optimize their uptake. It is important that organisations measure and report on the impact of their social media efforts. The findings of well-planned evaluations will provide empiric evidence of their effectiveness and inform best practices for designing impactful social media messages.

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COMPETING INTERESTS STATEMENT

None declared.

AUTHORS' CONTRIBUTIONS

RF developed the protocol for the study, and AG, KS, SDS, and LH provided input. AG, RF, and KS developed the Tweets and blog posts. RF and KS collected the data. AG analysed the data and drafted the manuscript. RF, KS, SDS, and LH critically revised the manuscript draft for important intellectual content. All authors agreed to be accountable for all aspects of the work and approved of the final version as submitted to the journal.

DATA SHARING STATEMENT

The data collected for this study are available from the corresponding author upon reasonable request.

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Supplementary File 1. Sample blog shot images

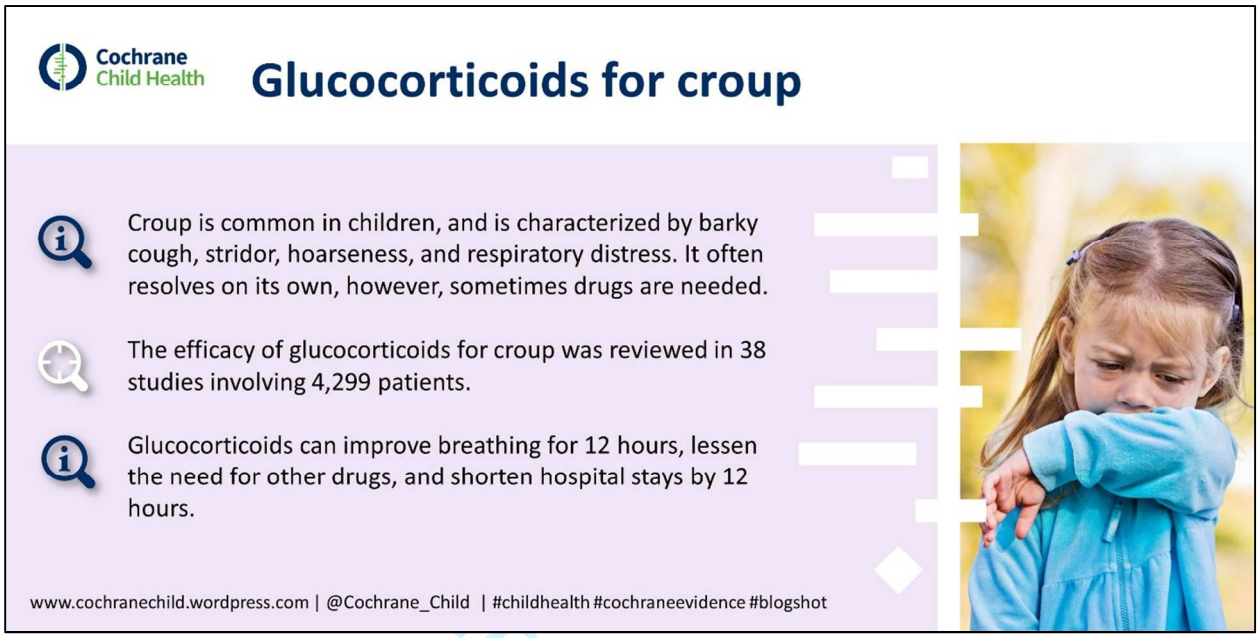

Figure 1. Sample blog shot image for croup

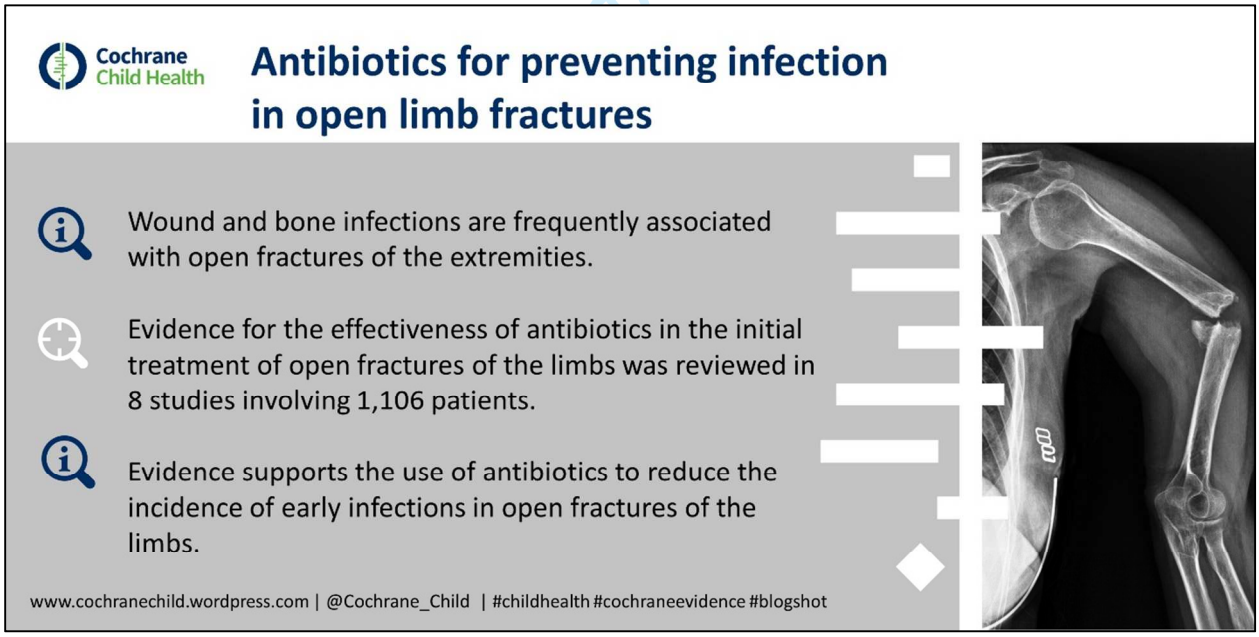

Figure 2. Sample blog shot image for fractures

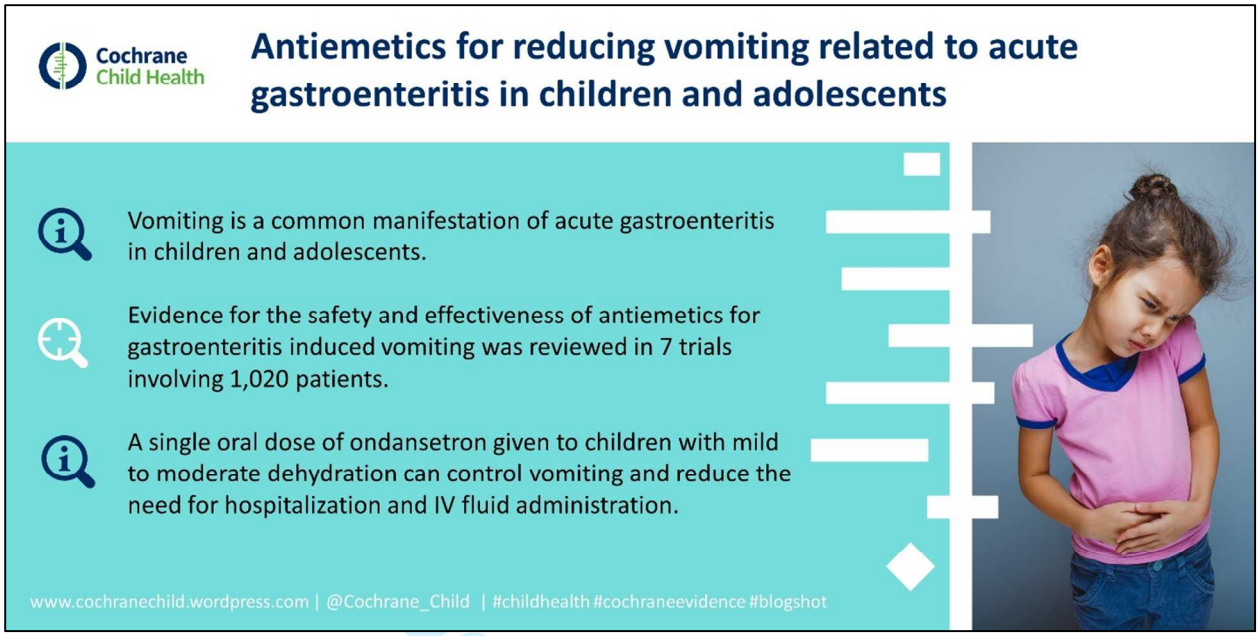

Figure 3. Sample blog shot image for gastroenteritis

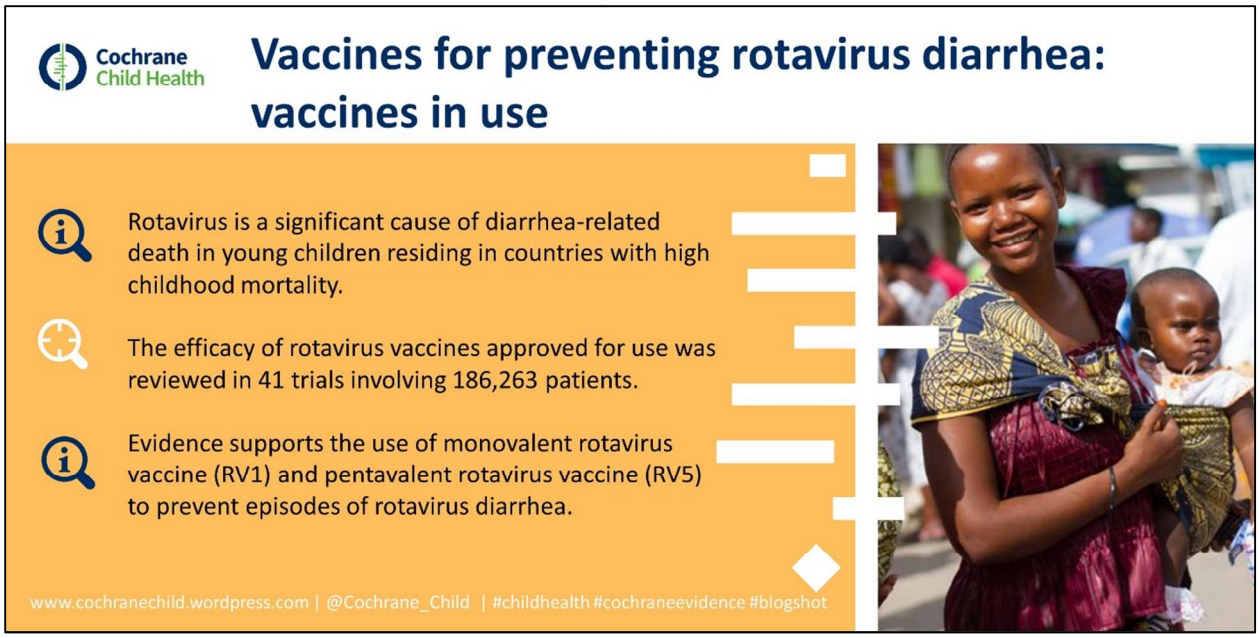

Figure 4. Sample blog shot image for intussusception

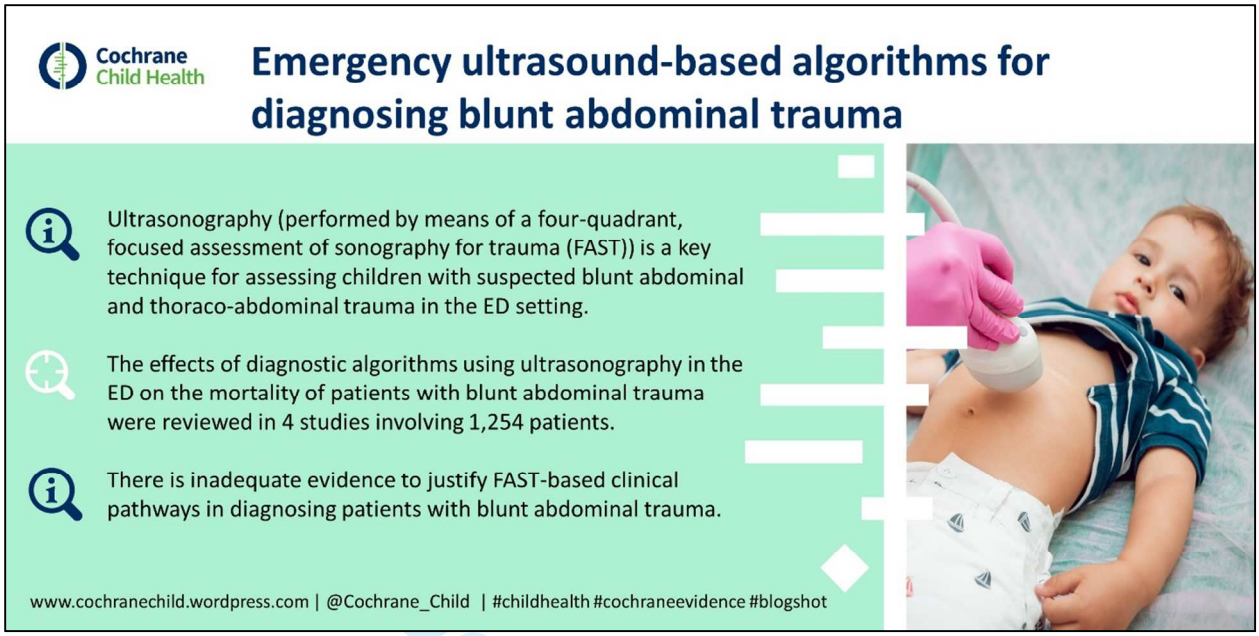

Figure 5. Sample blog shot image for multisystem trauma

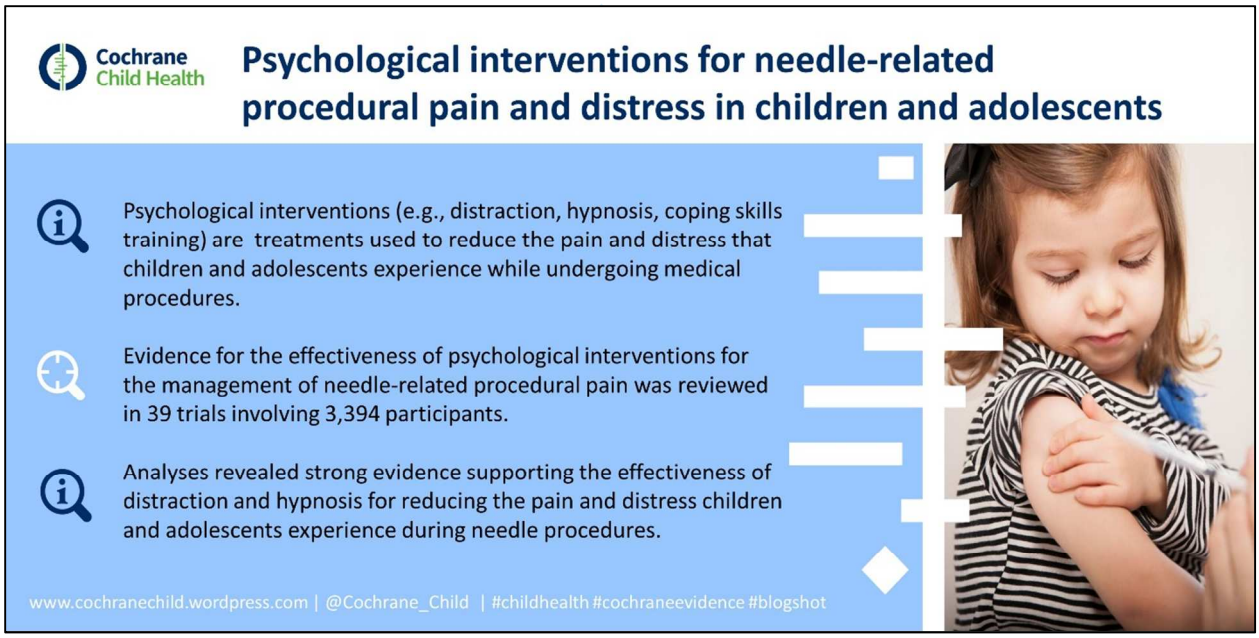

Figure 6. Sample blog shot image for procedural pain

Supplementary File 2. Sample image-based tweets promoting the Cochrane systematic reviews

Figure 1. Sample image-based tweet for croup

Figure 2. Sample image-based tweet for fractures

Figure 3. Sample image-based tweet for gastroenteritis

Figure 4. Sample image-based tweet for intussusception

Figure 5. Sample image-based tweet for multisystem trauma

Figure 6. Sample image-based tweet for procedural pain

Supplementary File 3. Weekly user interaction with the @TREKKca and @Cochrane_Child Twitter accounts

Week	Topic	@TREKKca, N				@Cochrane_Child, N			
		Retweets	Favourites	Impressions	Engagements	Retweets	Favourites	Impressions	Engagements
1	Multisystem Trauma	41	25	11,621	135	17	19	10,600	140
2	Fractures	28	23	11,600	324	40	37	17,014	389
3	Multisystem Trauma	27	27	8,450	281	15	13	11,777	154
4	Croup	60	39	14,059	293	104	59	24,106	658
5	Multisystem Trauma	23	21	9,503	145	17	14	10,255	156
6	Fractures	18	17	9,162	117	50	26	16,913	336
7	Intussusception	26	24	11,821	183	89	43	19,181	408
8	Multisystem Trauma	10	15	8,422	289	27	28	15,008	185
9	Multisystem Trauma	41	34	11,957	274	46	24	15,030	269
10	Gastroenteritis	53	40	15,122	362	68	44	17,331	497
11	Procedural Pain	44	42	17,230	420	109	74	23,756	622
12	Gastroenteritis	36	26	10,816	232	117	65	25,141	838
13	Multisystem Trauma	35	30	11,067	284	34	26	12,692	278
14	Croup	39	21	10,764	243	85	67	18,672	611
15	Fractures	41	26	12,498	218	35	31	18,245	261
16	Croup	47	36	17,982	380	41	23	17,452	302
Total		569	446	192,074	4,180	894	593	273,173	6,104
Mean ±SD per week		36 ±13	28 ±8	12,005 ±2,843	261 ±88	56 ±35	37 ±20	17,073 ±4,560	382 ±209

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	Page(s)
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-5
Objectives	3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	5-8
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	8-9
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	n/a
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	8-9
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	8-9
Bias	9	Describe any efforts to address potential sources of bias	n/a
Study size	10	Explain how the study size was arrived at	n/a
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	9
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	9
		(*b*) Describe any methods used to examine subgroups and interactions	n/a
		(*c*) Explain how missing data were addressed	n/a
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	n/a
		(*e*) Describe any sensitivity analyses	n/a
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	n/a
		(b) Give reasons for non-participation at each stage	n/a
		(c) Consider use of a flow diagram	n/a
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	n/a
		(b) Indicate number of participants with missing data for each variable of interest	n/a
Outcome data	15*	Report numbers of outcome events or summary measures	9-15
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear	9-15

		which confounders were adjusted for and why they were included	
		(*b*) Report category boundaries when continuous variables were categorized	n/a
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	n/a
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	n/a
Discussion			
Key results	18	Summarise key results with reference to study objectives	16
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	3
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	16-18
Generalisability	21	Discuss the generalisability (external validity) of the study results	3
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	19

BMJ Open

Dissemination of evidence in pediatric emergency medicine: a quantitative descriptive evaluation of a 16-week social media promotion

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Primary Subject Heading:	Communication
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Keywords:	social media, Twitter, blogs, ACCIDENT & EMERGENCY MEDICINE, pediatrics, knowledge dissemination

Title. Dissemination of evidence in pediatric emergency medicine: a quantitative descriptive evaluation of a 16-week social media promotion

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ABSTRACT

Objectives. TRanslating Emergency Knowledge for Kids (TREKK) and Cochrane Child Health collaborate to develop knowledge products on pediatric emergency medicine topics. Via a targeted social media promotion, we aimed to increase user interaction with the TREKK and Cochrane Child Health Twitter accounts, and the uptake of TREKK Bottom Line Recommendations (BLRs) and Cochrane systematic reviews (SRs).

Design. Quantitative descriptive evaluation.

Setting. We undertook this study and collected data via the Internet.

Participants. Our target users included online healthcare providers and health consumers.

Intervention. For 16 weeks we used Twitter accounts (@TREKKca and @Cochrane_Child) and the Cochrane Child Health blog to promote 6 TREKK BLRs and 16 related Cochrane SRs. We published 1 blog post and 98 image-based tweets per week.

Primary and secondary outcome measures. The primary outcome was user interaction with @TREKKca and @Cochrane_Child. Secondary outcomes were visits to TREKK's website and the Cochrane Child Health blog, clicks to and views of the TREKK BLRs, and Altmetric scores and downloads of Cochrane SRs.

Results. Followers to @TREKKca and @Cochrane_Child increased by 24% and 15%, respectively. Monthly users of TREKK's website increased by 29%. Clicks to the TREKK BLRs increased by 22%. The BLRs accrued 59% more views compared to the baseline period. The 16 blog posts accrued 28% more views compared to the eight previous months when no new posts were published. The Altmetric scores for the Cochrane SRs increased by ≥10 points each. The mean number of full text downloads for the promotion period was higher for 9 and lower for 7 SRs compared to the 16-week average for the previous year (mean difference (SD), +4.0 (22.0%)).

Conclusions. There was increased traffic to TREKK knowledge products and Cochrane SRs during the social media promotion. Quantitative evidence supports blogging and tweeting as dissemination strategies for evidence-based knowledge products.

Keywords: social media, Twitter, blogs, emergency medicine, pediatrics, knowledge dissemination, knowledge translation, knowledge synthesis, systematic reviews

STRENGTHS AND LIMITATIONS OF THIS STUDY

- We undertook a carefully planned social media promotion using multiple platforms (Twitter accounts and blogs), allowing us to reach a broad and diverse audience.
- Our study provides a useful benchmark for other groups wanting to undertake similar endeavours.
- In the absence of guidance, we based our a priori goals on historical measures of performance, and selected quantitative social media metrics to measure their achievement.
- Our study does not account for the organic growth of Twitter followership and website viewership.
- We cannot ascertain to what extent our own tweets contributed to increases in Altmetric scores.

BACKGROUND

The slow or incomplete translation of evidence into clinical practice undermines healthcare professionals' (HCPs') ethical obligation to provide patients with the highest standard of care while avoiding undue risk of harm.[1] Globally and across medical specialties, evidence-to-practice gaps that lead patients to receive substandard care nevertheless remain common. A systematic review of survey data found that median adherence to evidence-based clinical practice guidelines was just 36% (interquartile range, 30-56%).[2] For children, the majority of whom are cared for in non-specialty, general emergency departments,[3,4] the inadequate awareness and adoption of age-specific standards of care is especially problematic.[5-7] Targeted knowledge translation strategies may contribute to improving HCPs' awareness and application of evidence-based guidance for common acute childhood conditions.

Social media platforms are a convenient means to disseminate evidence-based health information. Among other venues, freely accessible platforms like Twitter and Facebook are increasingly being used by HCPs and patients to seek out information and communicate online.[8,9] Along with advances in the use of social media in healthcare settings, free open-access medical education (FOAM) has grown rapidly in the past decade.[10-12] As part of the FOAM movement, HCPs can create free and openly available educational resources which may then be rapidly disseminated through social media to colleagues and trainees.[10,11] Sharing evidence-based resources on social media platforms may also improve patient and public access to high quality health information.[13,14]

TRanslating Emergency Knowledge for Kids (TREKK, http://trekk.ca) is a Canadian knowledge mobilisation initiative driven by a network of researchers, HCPs, and consumers committed to increasing the uptake of high-quality pediatric emergency medicine evidence.[15,16] TREKK creates open-access, evidence-based knowledge products to address the information and education needs of HCPs. These include: an Evidence Repository populated with expert-selected guidelines, Cochrane systematic reviews, and other key studies; and Bottom Line Recommendations (BLRs) that provide summaries of key facts and recommendations for the diagnosis and treatment of acute childhood conditions.[15,16]

TREKK collaborates with Cochrane Child Health (http://childhealth.cochrane.org/) by highlighting Cochrane evidence on pediatric emergency medicine topics within its knowledge products. Cochrane systematic reviews bring together all available research on healthcare interventions, providing the best evidence for informed clinical decision-making. Specific to pediatric healthcare, Cochrane Child Health

works with Cochrane to advocate for systematic reviews that reflect the needs of children, facilitate systematic reviews on child health topics, develop methods for synthesizing child-relevant health research, and translate Cochrane knowledge to relevant stakeholders.[17]

TREKK's Twitter account (@TREKKca) was established in December 2011. Although TREKK aims to serve Canadian HCPs and families, much of the content disseminated via its Twitter account is universally relevant. The Cochrane Child Health Twitter account (@Cochrane_Child) was established in September 2013 and aims to serve an international audience of researchers and HCPs. The Cochrane Child Health blog (https://cochranechild.wordpress.com/), established in November 2014, aims to translate child-relevant Cochrane evidence to HCPs and families. Both Twitter accounts and the blog are managed out of the Alberta Research Centre for Health Evidence (ARCHE), University of Alberta, Canada.

We used social media to disseminate and promote the uptake of TREKK knowledge products and Cochrane systematic reviews on pediatric emergency medicine topics. ARCHE researchers and staff are involved in the administration of Cochrane Child Health and in the development and dissemination of TREKK knowledge products for HCPs, patients, and families. Because Cochrane systematic reviews provide the foundation for many of the TREKK knowledge products, including the BLRs for HCPs, we promoted the reviews and TREKK knowledge products concurrently to advocate for the use and improve the uptake of these complementary products. Via a 16-week promotion, we aimed to increase: 1. user interaction with the TREKK and Cochrane Child Health Twitter accounts; 2. visits to the TREKK website and clicks to and views of TREKK BLRs; and 3. visits to the Cochrane Child Health blog and Altmetric scores and downloads for the Cochrane systematic reviews.

METHODS

Promotion Summary

We ran a 16-week social media promotion from September 5 to December 25, 2016 using blog posts and tweets. Our primary audience for the promotion was HCPs and trainees. Our secondary audience was health consumers providing care to children (parents, families). The promotion followed an a priori protocol (**Supplementary File 1**).

In addition to our overarching objectives, we decided on specific goals that we aimed to achieve by the end of the promotion (**Box 1**). Our goals were based on benchmark performance indicators established during a previous social media promotion undertaken by our centre in the Fall of 2015 to promote Cochrane summaries, and on historical performance of the blog. During the Fall 2015 promotion,

followers to @TREKKca increased by 15% (from 452 to 521) and the Altmetric scores for the promoted Cochrane systematic reviews increased by a mean 10 points. Between inception (2013) and 2015, 35 posts were published on the Cochrane Child Health Blog. These posts received 10,109 views, or 289 views per post. We therefore aimed to accrue 289 new views per blog post during the promotional period, added to the baseline views for 2016 (1453 views). In the absence of a priori performance data, we set modest goals for visits to the TREKK website and clicks to the TREKK BLRs.

Box 1. Specific goals for the social media promotion

1. Increase followers of the TREKK and Cochrane Child Health Twitter accounts by 15%.
2. Increase site visits to the TREKK website by 10%.
3. Increase clicks to the TREKK BLRs by 10% for the first promotional week, and by 5% in each additional week.
4. Increase site visits to the Cochrane Child Health blog to 6,077 views.
5. Increase Altmetric (http://altmetric.com) scores for the promoted Cochrane systematic reviews by 10 points each.

Table 1 shows our weekly promotion schedule. TREKK's national needs assessment informed the topics that we selected. As part of the needs assessment, 1,471 HCPs from 32 Canadian general emergency departments completed surveys on the pediatric emergency medicine topics for which information for evidence-based care would be of interest.[16,18] From the priority list of topics from the survey, we selected those where the TREKK Evidence Repository contained a relevant Cochrane systematic review (croup, fractures, gastroenteritis, intussusception, multisystem trauma, and procedural pain). This allowed us to promote TREKK's knowledge products and Cochrane Child Health evidence concurrently.

Table 1. Detailed weekly social media promotion schedule

Week	TREKK BLR	Cochrane systematic review
September 5-11	Multisystem Trauma	Thromboprophylaxis for trauma patients
September 12-18	Fractures	Surgical interventions for diaphyseal fractures of the radius and ulna in children
September 19-25	Multisystem Trauma	Prophylactic antibiotics for penetrating abdominal trauma
September 26-October 2	Croup	Nebulized epinephrine for croup in children
October 3-9	Multisystem Trauma	Selective computed tomography (CT) versus routine thoracoabdominal CT for high-energy blunt-trauma patients
October 10-16	Fractures	Antibiotics for preventing infection in open limb fractures
October 17-23	Intussusception	Vaccines for preventing rotavirus diarrhoea: vaccines in use
October 24-30	Multisystem Trauma	Non-operative versus operative treatment for blunt pancreatic

Week	TREKK BLR	Cochrane systematic review
		trauma in children
October 31-November 6	Multisystem Trauma	Antifibrinolytic drugs for acute traumatic injury
November 7-13	Gastroenteritis	Oral versus intravenous rehydration for treating dehydration due to gastroenteritis in children
November 14-20	Procedural Pain	Psychological interventions for needle-related procedural pain and distress in children and adolescents
November 21-27	Gastroenteritis	Antiemetics for reducing vomiting related to acute gastroenteritis in children and adolescents
November 28-December 4	Multisystem Trauma	Emergency ultrasound-based algorithms for diagnosing blunt abdominal trauma
December 5-11	Croup	Glucocorticoids for croup
December 12-18	Fractures	Interventions for treating femoral shaft fractures in children and adolescents
December 19-25	Croup	Heliox for croup in children

BLR: Bottom Line Recommendation

Blog Posts

Throughout the promotion, we published posts on the Cochrane Child Health blog. We published an introductory blog post during the week of August 29, 2016 that briefly described our promotion. Subsequently, we posted one blog post per week. Each blog post contained: the plain language summary for a Cochrane systematic review, published with permission from Wiley; a "blog shot" image (image-based summary containing three key messages from the Cochrane systematic review); and citations and traceable links to TREKK knowledge products (Evidence Repository and BLRs) and the full text of the Cochrane systematic review. **Supplementary File 2** includes sample blog shot images.

The intent of our blog posts was to provide concise, informative summaries of the findings of child health Cochrane systematic reviews that would be more appealing to our target audience. Freely accessible plain language summaries were introduced with the aim of improving the uptake of Cochrane systematic reviews by overcoming barriers including: the length of the reviews and the use of scientific jargon, which make them impractical to read and difficult to understand for many HCPs and health consumers; and challenges related to the technical and financial access to the full text documents, which are not open access.[19] Studies in the specialties of surgery and radiology have shown that blogging about research publications is an effective means to improve the dissemination and reach of the key messages and of the publications themselves.[20,21]

Tweets

We published 98 tweets per week from four Twitter accounts: @TREKKca, @Cochrane_Child, @arche4evidence (ARCHE), and @TRIPChildHealth (Turning Research Into Practice (TRIP) database for high quality clinical research). These tweets included traceable links to the relevant TREKK knowledge products, the Cochrane systematic review, and the Cochrane Child Health blog.

We used Buffer (https://buffer.com) to pre-schedule the tweets for publication at peak-traffic times for all Twitter accounts. We included images in each tweet. These included the aforementioned blog shots, as well as images modified from files supplied by Cochrane UK, ShutterStock, the TREKK knowledge products development team, and other websites containing public domain images (e.g., Wikimedia Commons, thenounproject.com). We also used the Pablo image editor in Buffer (https://pablo.buffer.com/) to create images to promote the Cochrane systematic reviews. During weeks when sensitive topics were covered (e.g., multisystem trauma), we used general emergency medicine images (e.g., ambulances, medical equipment) as to inform our audience without posing undue discomfort. **Supplementary File 3** shows samples of our image-based tweets.

Audience Engagement

During the week of August 29, 2016, we e-mailed the corresponding authors and the Cochrane Review Groups (who manage the editorial processes associated with the production and publication of Cochrane systematic reviews) for each of the 16 Cochrane systematic reviews that we planned to promote. We informed them of our intention to promote their review via social media, provided the dates of the promotion, and encouraged them to check the Cochrane Child Health Twitter account and retweet our messages. We invited the corresponding authors to provide key messages for the blog. We also contacted TREKK content advisers and shared our intention to promote the TREKK knowledge products and Cochrane systematic reviews. We invited them to retweet our messages and provide a quote as to the value of the selected Cochrane systematic review and of their BLR for HCPs.

During the promotion, members of our team (RF, EH) monitored the Twitter accounts and replied to comments about the promoted content. Through our replies, we aimed to promote further engagement with TREKK and Cochrane Child Health. We did not dispense clinical information but committed to sharing the feedback with our team.

Patient Involvement

Although we did not involve patients in the development of the research questions or choice of outcome measures, health consumers were one of the target audiences for our promotion. We

incorporated features into the promotion that would enhance its appeal to health consumers, including the plain language summaries and blog shots. We disseminated the findings of this study to our followers, including health consumers, via image-based tweets from the four Twitter accounts.

Data Collection

Throughout the promotion, we collected indicators of engagement with our Twitter accounts, the uptake of TREKK BLRs and Cochrane systematic reviews, and visits to the TREKK website and Cochrane Child Health blog. We stored the data in a Microsoft Office Excel (v. 2016, Microsoft Corporation, Redmond, WA) workbook.

On August 15, 2016, we recorded the baseline Twitter followers for the @Cochrane_Child and @TREKKca accounts. One week following the completion of the promotion, we again recorded the total followers at each account. To measure user interaction with our accounts, each week during the promotion we collected metrics from the Twitter activity dashboard. These included the number of retweets (times a user retweeted our tweet), favourites (times a user favourited our tweet), impressions (times a user followed our accounts directly from a tweet), and engagements (times a user interacted with our tweet, i.e., clicked anywhere on the tweet, including retweets, replies, follows, likes, links, cards, hashtags, embedded media, username, profile photo, or tweet expansion).[22]

At baseline (average for the months of July and August 2016) and following the promotion (December 25, 2016), we collected the number of site visits to http://trekk.ca, measured by the number of sessions, page views, and users via Google Analytics (http://www.google.com/analytics/) reports. We collected the number of clicks to the TREKK BLRs using the @arche4evidence bit.ly (https://bitly.com) account. We collected click count data at baseline (August 15, 2016), and 30 days after the links to the BLRs were created (beginning on October 5, 2016 and weekly until February 1, 2017). We also collected the number of BLR document views at baseline (for the 16-week period before the promotion) and during the promotion period via reports produced by http://trekk.ca.

We collected the number of site visits to the Cochrane Child Health blog for the three years prior to the promotion, at baseline (year-to-date on August 15, 2016), and following the promotion (January 3, 2017) via information provided by WordPress (http://wordpress.com). We recorded Altmetric scores provided by http://altmetric.com for each of the systematic reviews at baseline (August 15, 2016) and at the end of the promotion (December 25, 2016). Altmetrics are non-traditional metrics that complement traditional citation impact metrics like the Impact Factor.[23] The score provided by altmetric.com is a

composite measure of an article's dissemination (i.e., readership), whereby more popular (or "buzzworthy") articles are scored more highly.[24] Following the promotion, Wiley (the publisher for Cochrane systematic reviews) provided full text download data for the period of September 2015 to January 2017 for each of the systematic reviews that we promoted.

Data Analysis

We calculated descriptive statistics in Excel. We calculated the increase in Twitter followers by subtracting the baseline followers from the total followers at the end of the promotion for each account, and calculated the percent increase. We calculated the total and mean (standard deviation [SD]) retweets, favourites, impressions, and engagements per week, per topic, and overall for each account. We calculated the total users, sessions, and page views for the TREKK website for each promotion month, and the monthly average (SD). We calculated the total clicks to and views of the BLRs, and the percent increase in clicks and views from baseline, by topic and overall. We calculated the percent increase in visits to the Cochrane Child Health blog during the campaign compared to baseline. We calculated the point increase and percent increase in Altmetric scores, and percent change in the number of full text downloads for each Cochrane systematic review compared to baseline. We compared all metrics to our a priori goals to determine which we had achieved.

RESULTS

User Interactions with @TREKKca and @Cochrane_Child

At baseline, the @TREKKca and @Cochrane_Child Twitter accounts had 633 and 1,934 followers, respectively. During the promotion, the @TREKKca account gained 149 followers (23.5% increase) to a total 782 followers. The @Cochrane_Child account gained 283 followers (14.6% increase) to a total 2,217 followers. We met our goal of increasing followers to each account by 15%.

Table 2 shows user interactions with each Twitter account, stratified by topic. Detailed weekly interaction data are available in **Supplementary File 4**. During the campaign, the @TREKKca account received a mean (SD) of 36 (13) retweets, 28 (8) favourites, 12,005 (2,843) impressions, and 261 (88) engagements per week. The @Cochrane_Child account received a mean (SD) of 56 (35) retweets, 37 (20) favourites, 17,073 (4,560) impressions, and 382 (209) engagements per week.

TREKK Website and Knowledge Products

Table 3 shows the monthly site visits to the TREKK website. During the months of July and August 2016 (baseline), the TREKK website logged a mean of 893 users, 1,378 sessions, and 4,642 page views per

month. During the promotion, the website logged a total of 4,608 users, 6,955 sessions, and 19,090 page views. This equated to a mean (SD) of 1,152 (151) users, 1,739 (217) sessions, and 4,773 (688) page views per month. On average, there were 29% more users, 26% more sessions, and 2.8% more page views per month during the promotion than at baseline. We surpassed our goal of increasing site visits to the website by 10% based on the number of users and sessions, but not on number of page views.

Table 4 shows the clicks to and views of the TREKK BLRs. At baseline (August 15, 2016), there were 1,429 clicks to the BLRs. During the promotion, the total number of clicks increased to 1,746 (317 click increase, 22.2%). For the 16-week period before the promotion (baseline), the BLRs were viewed 574 times. During the promotion, the BLRs accrued 915 views (314 [59.4%] more than baseline). There were more views during the promotion than during the baseline period for all of the BLRs (range, 23.3 to 116.0% more). We achieved our goal of increasing the clicks to all of the BLRs by 10% for the first promotional week, and 5% for each additional week promoted, except for those on croup and multisystem trauma.

Cochrane Child Health Blog and Cochrane Systematic Reviews

In the three years before the campaign (2013 to 2015), there were a total of 38 posts to the Cochrane Child Health Blog, and 8,625 site views (108, 1,192, and 7,325 views, respectively). From January 1 to August 15, 2016 there were no new posts and 1,453 site views. During the campaign, we published 17 new blog posts. The blog accrued 1,856 new views, to a total 3,309 views for the year 2016. We did not achieve our goal of increasing the number of views to the blog to 6,077 (289 views for each new post, based on performance from 2013 to 2015).

Table 5 shows the Altmetric scores and downloads for the Cochrane systematic reviews. The Altmetric scores for all of the promoted Cochrane systematic reviews increased during the campaign. The mean (SD) point increase was 16.7 (5.1). We achieved our goal of increasing the Altmetric scores for the Cochrane systematic reviews by 10 points each. Compared to the mean number of downloads during a 16-week period for the year before the promotion (baseline), the total downloads for the Cochrane systematic reviews did not consistently increase during the promotion, and decreased for seven of 16 (44%) reviews. Compared to the baseline download rate, there was a mean (SD) 4.0 (22.0)% increase in the number of times the promoted Cochrane systematic reviews were downloaded.

Table 2. User interaction with the @TREKKca and @Cochrane_Child Twitter accounts, stratified by topic

Topic	Weeks promoted	@TREKKca, N total (N/week)[1]				@Cochrane_Child, N total (N/week)[1]			
		Retweets	Favourites	Impressions	Engagements	Retweets	Favourites	Impressions	Engagements
Croup	3	146 (49)	96 (32)	42,805 (14,268)	916 (305)	230 (77)	149 (50)	60,230 (20,077)	1,571 (524)
Fractures	3	87 (29)	66 (22)	33,260 (11,087)	659 (220)	125 (42)	94 (31)	52,172 (17,391)	986 (329)
Gastroenteritis	2	89 (45)	66 (33)	25,938 (12,969)	594 (297)	185 (93)	109 (55)	42,472 (21,236)	1,335 (668)
Intussusception	1	26 (26)	24 (24)	11,821 (11,821)	183 (183)	89 (89)	43 (43)	19,181 (19,181)	408 (408)
Multisystem Trauma	6	177 (30)	152 (25)	61,020 (10,170)	1,408 (235)	156 (26)	124 (21)	75,362 (12,560)	1,182 (197)
Procedural Pain	1	44 (44)	42 (42)	17,230 (17,230)	420 (420)	109 (109)	74 (74)	23,756 (23,756)	622 (622)
Total	16	569 (36)	446 (28)	192,074 (12,005)	4,180 (261)	894 (56)	593 (37)	273,173 (17,073)	6,104 (382)

[1]We based the weekly interactions on the total number of weeks that we promoted the topic.

Table 3. Overall monthly site visits to the TREKK website (trekk.ca)[1]

Time point	Users[2]	Sessions	Page views
Baseline[3]	893	1,378	4,642
September 2016	1,004	1,512	4,082
October 2016	1,133	1,736[4]	4,795
November 2016	1,362	2,031[4]	5,707[5]
December 2016	1,109	1,676[4]	4,506
Total	4,608	6,955	19,090
Mean ±SD	1,152 ±151	1,739 ±217	4,773 ±688

SD: standard deviation; TREKK: TRanslating Emergency Knowledge for Kids

[1]We aimed to increase the total monthly users, sessions, and page views for the website by 10%.

[2]We exceeded our goal of 928 users per month (total, 3,928 users) each month during the promotion.

[3]Average values for the months of July and August 2016.

[4]Months during which we exceeded our goal of 1,516 sessions per month (total, 6,065 sessions).

[5]Month during which we exceeded our goal of 5,106 page views per month (total, 20,424 page views).

Table 4. Clicks to and document views of the TREKK Bottom Line Recommendations, stratified by topic

BLR topic	Weeks promoted	Clicks,[1] N total				Document views,[2] N total		
		Baseline	Goal[3]	Total clicks (N/week)	Percent increase	Baseline	Total views (N/week)	Percent increase
Croup	3	438	526	489 (163)	11.6%	155	265 (88)	71.0%
Fractures	3	386	463	478 (159)	23.8%	176	217 (72)	23.3%
Gastroenteritis	2	298	343	386 (193)	29.5%	106	229 (115)	116.0%
Intussusception	1	150	165	186 (186)	24.0%	63	90 (90)	42.9%
Multisystem Trauma	6	157	212	207 (35)	31.8%	74	114 (19)	54.1%
Total[4]	15	1,429	1,709	1,746 (116)	22.2%	574	915 (61)	59.4%

BLR: Bottom Line Recommendation; TREKK: TRanslating Emergency Knowledge for Kids

[1]Clicks on bit.ly links. We collected baseline data on August 15, 2016.

[2]Based on TREKK.ca analytics. We collected baseline data for the period 16 weeks before the promotion.

[3]We aimed to increase the number of clicks to the TREKK Bottom Line Recommendations by 10% for the first week that we promoted it, and 5% for each additional week (i.e., 20% for three weeks of promotion).

[4]The Bottom Line Recommendation for procedural pain was published in October 2016, so we had no baseline data for this topic and did not include it in the calculation of the totals. We promoted the Bottom Line Recommendation for procedural pain for one week and it received 105 views over the promotion period.

Table 5. Altmetric scores and full text downloads for the promoted Cochrane systematic reviews

Week	Cochrane systematic review	Altmetric score, points				Full text downloads, N total		
		Baseline[1]	Goal[2]	Final	Point increase (%)	Baseline[3]	Final	Percent difference
1	Thromboprophylaxis for trauma patients	6	16	21	15 (250.0)	426	385	-9.5%
2	Surgical interventions for diaphyseal fractures of the radius and ulna in children	0	10	13	13 (130.0)	79	82	+4.1%
3	Prophylactic antibiotics for penetrating abdominal trauma	14	24	25	11 (78.6)	136	119	-12.7%
4	Nebulized epinephrine for croup in children	33	43	53	20 (60.6)	612	595	-2.8%
5	Selective computed tomography (CT) versus routine thoracoabdominal CT for high-energy blunt-trauma patients	0	10	10	10 (100.0)	128	149	+16.7%
6	Antibiotics for preventing infection in open limb fractures	4	14	18	14 (350.0)	263	252	-4.1%
7	Vaccines for preventing rotavirus diarrhoea: vaccines in use	36	46	54	18 (50.0)	406	386	-5.0%
8	Non-operative versus operative treatment for blunt pancreatic trauma in children	2	12	16	14 (700.0)	82	93	+14.1%
9	Antifibrinolytic drugs for acute traumatic injury	49	59	63	14 (28.6)	596	484	-18.8%
10	Oral versus intravenous rehydration for treating dehydration due to gastroenteritis in children	14	24	36	22 (157.1)	345	492	+42.6%
11[4]	Psychological interventions for needle-related procedural pain and distress in children and adolescents	-	-	109	-	910	999	+9.8%
12	Antiemetics for reducing vomiting related to acute gastroenteritis in children and adolescents	42	52	62	20 (47.6)	443	685	+54.6%
13	Emergency ultrasound-based algorithms for diagnosing blunt abdominal trauma	3	13	23	20 (666.7)	557	350	-37.2%
14	Glucocorticoids for croup	16	26	46	30 (187.5)	777	795	+2.3%
15	Interventions for treating femoral shaft fractures in children and adolescents	4	14	17	13 (325.0)	222	245	+10.4%
16	Heliox for croup in children	16	26	32	16 (100.0)	250	251	+0.2%
Mean ±SD		-	-	-	16.7 ±5.1 (215.4 ±214.0)	-	-	+4.0 (22.0)%

[1]Baseline altmetric.com scores were collected for each Cochrane systematic review on August 15, 2016.

[2]We aimed to increase the altmetric.com scores for each Cochrane systematic review that we promoted by 10 points.
[3]We calculated the average weekly downloads from the previous year (52 weeks), and multiplied this by 16 to obtain the average number of downloads for a 16 week period in the year prior to the promotion.
[4]We did not originally plan to promote this Cochrane systematic review, so we did not collect the baseline altmetric.com score. We replaced the systematic review that we originally planned to promote following a request from the knowledge products development team.

DISCUSSION

Using Twitter and blogs, we aimed to disseminate and promote the uptake of TREKK knowledge products and Cochrane systematic reviews on pediatric emergency medicine topics. Although our study design precludes inferring causation, during the campaign period we successfully increased the number of followers to the TREKK and Cochrane Child Health Twitter accounts by a respective 24% and 15%. We also observed increased traffic to the TREKK website, and a 22% increase in clicks to, and 59% increase in views of the TREKK BLRs. Although full text downloads of the Cochrane systematic reviews did not universally increase, the Altmetric scores increased by at least 10 points for each review. Despite not meeting our target views for the Cochrane Child Health blog, monthly traffic to the site was 1.5 times greater during the promotion compared to the previous eight months during which we had published no new posts.

Common barriers to the adherence to evidence-based guidelines in medical practice include inadequate knowledge of the guideline, attitudes (e.g., lack of motivation or self-efficacy), and behavioural factors (e.g., patient preferences, organisational constraints).[25] With respect to knowledge, especially for conditions where new evidence is accumulating quickly, keeping up with the latest guidance can be overwhelming or impossible.[10,26] Moreover, as not all published research is freely available,[27] the latest evidence may not be accessible by all HCPs. The rapid and continued growth of FOAM represents one important step toward reducing evidence-to-practice gaps in medicine by supporting free access to a dynamic collection of tools and resources for continuing education.[28] Just as HCPs are interested in keeping informed, author groups and organisations are seeking practical means to expand the visibility and uptake of their research and knowledge products. Our data suggest that targeted social media promotions can successfully drive traffic toward websites and products that support evidence-based practices.

Knowledge of the facets of effective social media messages will help to guide the planning and implementation of successful promotions. As many investigations of text-only tweets already exist,[20,29-31] our study is novel in that we committed to including custom images that supported the messages in all of our tweets. Ibrahim et al. (2017) designed a prospective, case-control crossover study whereby academic research articles were promoted using text-based tweets as well as tweets containing visual abstracts.[32] Compared to the text-based tweets, those that contained visual abstracts were retweeted 8.4 times more often ($p<0.001$) and received 7.7 times as many impressions ($p<0.001$).[32] Even when images are unrelated to the posted content, their simple presence can entice

users to read the accompanying tweet.[29] Nevertheless, real-life prospective evaluations comparing tweets of various content (e.g., text, images, videos) are few, so how to best structure a tweet aimed at disseminating knowledge products is not well known. Algorithms are being developed with the goal of predicting the popularity and lifespan of tweets.[33-35] These may provide some insight into the components of effective promotional messages.

Despite marked increases in Twitter followers and in views of our knowledge products, full text downloads of the Cochrane systematic reviews were comparable to baseline overall, and were less than baseline for some reviews. Because we did not have access to page view data, we relied on full text downloads to estimate the uptake (i.e., number of reads) of the reviews. However, Cochrane systematic reviews are long and their statistical findings can be difficult to understand.[36] Moreover, HCPs typically spend only two minutes pursuing answers to healthcare questions,[37] and when reading published research, many do not read the full text and some read only the abstract.[38] The addition of Summary of Findings tables (which summarise the findings of the reviews in a user-friendly format) to Cochrane systematic reviews reduced the time to answer clinical questions from 1.5 to 4.0 minutes to 1.3 to 2.1 minutes, and increased HCPs' and researchers' understanding of the key findings.[36] It is plausible in our study that our followers accessed only the abstract and Summary of Findings tables and did not download the full text.[39] Thoma et al. (2017) reported similar results for a social media promotion (tweets and podcasts) of research published in the Canadian Journal of Emergency Medicine, whereby Altmetric scores and abstract readership, but not full text readership, significantly increased.[39] Being concise and easy to understand, our knowledge products may also have been more appealing to busy HCPs compared to the Cochrane systematic reviews that informed them.

Despite the growing popularity of FOAM, one of the most common criticisms is that of quality control.[14,28] To the same degree that social media allow evidence-based materials to be widely and rapidly disseminated, misinformed messages and fallacious materials can also propagate quickly. The onus is mainly on the knowledge users to decipher the quality of online health information. A number of scoring tools have been developed to measure the quality of Internet-based resources for patients and clinicians,[40,41] but their use in practice is uncommon.[42] More often, individuals use visual cues to rapidly appraise the credibility of online sources, including reputation, endorsement, consistency, self-confirmation, expectancy violation, and persuasive intent.[42,43] Visual cues, however, are not always reliable indicators of credibility (e.g., "unpopular" tweets can contain credible content).[42] In our promotion, we included our logos (TREKK and Cochrane) on the tweeted images, cited full text materials

in our blog posts,[28] and tweeted from reputable accounts to establish credibility. It would be interesting in future studies to investigate how these visual cues of credibility impact the uptake of knowledge products disseminated on social media.

Implications for Research and Practice

A challenge for organisations who want to undertake evaluations of social media for knowledge dissemination in health is that, to our knowledge, no guidelines exist on: 1. how to set goals, 2. what is reasonable to achieve, 3. which social media metrics can or should be tracked, and 4. what should be considered "successful". In the absence of guidance, we developed specific goals based on historical measures of performance and decided on quantitative social media metrics to evaluate their achievement. As researchers whose expertise does not lie in media communications, we overlooked alternative measures of performance, e.g., Symplur analytics to measure the reach of a promotion-specific hashtag, which may have provided a better indication of the promotion's disseminative potential (as recommended by an expert peer reviewer). Because many organisations do not have specialised personnel devoted to managing social media profiles, practical guidance for undertaking effective and efficient evaluations of their promotions is needed.

The significance of communities of practice for knowledge sharing and professional development in social media has only begun to be investigated. Traditionally, communities of practice develop around the interests of their members, and provide a vehicle to share expertise in an area of practice.[44,45] Communities of practice can improve patient care by fostering engagement, collaboration, learning, knowledge, and reflection.[46] Social media provide the opportunity to more easily and efficiently build networks of HCPs who share a common interest and desire to share their thoughts and experiences.[45] Developing new and leveraging existing networks may therefore be a promising approach to using social media to improve the uptake of knowledge products and inspire informed conversations and changes to practice.[45] Guidance for how to best develop and build online networks would be helpful to organisations wishing to move evidence into practice via the wide dissemination of knowledge tools.

An analysis of the #FOAMed online community of practice showed that it was organized around highly influential members who were responsible for 73% of all tweets.[47] On Twitter, these opinion leaders account for a small proportion of all users[48] but they can impact conversations substantially more than ordinary users.[48,49] Opinion leaders are likeable, trustworthy, educationally influential,[48,49] and highly credible,[50] and have greater social participation compared to their followers.[51] Users

may become opinion leaders because they have a large cohort of followers, their followers themselves are highly influential, or they have a unique group of followers to help disseminate information.[52] In the context of our study, no member of our research team is considered an influencer of emergency medicine physicians.[52] Garnering the attention of opinion leaders, however, could be a promising strategy to optimizing the dissemination and uptake of social media messages. Conversely, in the hands of highly influential users it is also possible for superficial or inaccurate messages to be rapidly and widely disseminated.[52] Empirical evaluations of the behaviour of highly influential Twitter users may inform approaches to optimise the uptake of shared content.

CONCLUSIONS

There was increased traffic to TREKK knowledge products and Cochrane systematic reviews during our social media promotion. Social media represent an appealing means to disseminating and promoting health knowledge products, thanks to the potential for a broad reach. Nevertheless, it is not entirely clear how social media messages should be structured to optimize their uptake. It is important that organisations measure and report on the impact of their social media efforts. The findings of well-planned evaluations will provide empiric evidence of their effectiveness and inform best practices for designing impactful social media messages.

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COMPETING INTERESTS STATEMENT

None declared.

AUTHORS' CONTRIBUTIONS

RF developed the protocol for the study, and AG, KS, SDS, and LH provided input. AG, RF, and KS developed the Tweets and blog posts. RF and KS collected the data. AG, RF, and KS analysed the data and AG drafted the manuscript. RF, KS, SDS, and LH critically revised the manuscript draft for important intellectual content. All authors agreed to be accountable for all aspects of the work and approved of the final version as submitted to the journal.

DATA SHARING STATEMENT

The data collected for this study are available from the corresponding author upon reasonable request.

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Supplementary File 1. A priori-protocol for the social media promotion

Summary:

We will run a 16 week social media promotion, titled the *Child Health Emergency Medicine Campaign*, using Twitter and blogs from September 5th to December 25th, 2016. Each week, we will publish a blog post on the Cochrane Child Health Wordpress site with a summary of a Cochrane systematic review on a pediatric emergency medicine (PEM) topic[1]. Our blog posts will also promote the Evidence Repository, Bottom line Recommendations (BLRs) and KT tools (eBooks, YouTube videos) from TRanslating Emergency Medicine for Kids (TREKK). 98 image-based Twitter messages (tweets) per week will share links to the blog post, the Cochrane review, and any applicable TREKK BLRs or KT tools.

Audiences:

The primary audience for our promotion will be PEM health professionals and trainees. A secondary audience, and the focus for promotion of TREKK KT tools, will be health consumers providing child care.

Our Social Media Team:

Team members from ARCHE and TREKK will have the following responsibilities:

Activity/Role	**Team members**
Create the social media plan	Robin, Kassi, Sandra, Allison
Approve the plan and the resources needed	Lisa, Denise, Michele, Lisa Knisley, Carly Leggett
Create the blog shots	Erin Hill
Compose the tweets	Kassi
Crete the blog posts	Allison
Approve content, schedule and post messages	Robin
Respond to comments	Erin (TREKK), Sandra (Cochrane Child), Robin (All)
Data collection	Robin
Reports creation	Robin, Kassi, Sandra, Allison

Goals:

Our goals for the promotion are to increase:

1. Twitter followers for @Cochrane_Child and @TREKKca
2. Downloads of TREKK BLRs
3. Altmetric.com scores for promoted Cochrane Systematic Reviews
4. Site visits to https://cochranechild.wordpress.com/
5. Site visits to www.trekk.ca
6. Views of TREKK KT tools

[1] We have received copyright permission from Cochrane and Wiley to reproduce the summaries on the blog site.

Fall 2016 Child Health Emergency Medicine Social Media Campaign
Project plan – Sept 2016

Objectives:

Target objectives are based on benchmark performance indicators established by the Cochrane Summaries promotion conducted in the fall of 2015.

1. Our promotion will increase followers for the @Cochrane_Child and @TREKKca Twitter accounts by 15%

Accounts	Baseline (Aug 15)	Goal (Dec 25)
@Cochrane_Child	1,934 followers	2,224 followers
@TREKKca	633 followers	728 followers

2. Our promotion will increase total clicks for the following TREKK BLRs[2] by 10% for the 1st promotional week, and then by 5% for each additional week (e.g., 20% for 3 weeks' promotion)

BLR	TREKK Report	Baseline (Aug 15)	Goal (Dec 25)	Promotional weeks
Fractures	http://trekk.ca/external_resources/1074	386	463	3
Intussusception	http://trekk.ca/external_resources/1159	150	165	1
Multisystem Trauma	http://trekk.ca/external_resources/850	157	212	6
Gastroenteritis	http://trekk.ca/external_resources/601	298	343	2
Croup	http://trekk.ca/external_resources/605	438	526	3

3. Our promotion will increase Altmetric.com scores for each Cochrane review by 10 points

Week	PEM Topic	Cochrane Review	Baseline (Aug 15)	Goal (Dec 25)
1: Sept 5-11	Multiple Trauma	Thromboprophylaxis for trauma patients	6	16
2: Sept 12-18	Fractures	Surgical interventions for diaphyseal fractures of the radius and ulna in children	0	10
3: Sept 19-25	Multiple Trauma	Prophylactic antibiotics for penetrating abdominal trauma	14	24
4: Sept 26-Oct 2	Croup	Nebulized epinephrine for croup in children	33	43
5: Oct 3-9	Multiple Trauma	Selective computed tomography (CT) versus routine thoracoabdominal CT for high-energy blunt-trauma patients	0	10
6: Oct 10-16	Fractures	Antibiotics for preventing infection in open limb fractures	4	14

[2] We will also promote the French language BLRs, but we will not collect usage data for these documents.

7: Oct 17-23	Intussusception	Vaccines for preventing rotavirus diarrhoea: vaccines in use	36	46
8: Oct 24-30	Multiple Trauma	Non-operative versus operative treatment for blunt pancreatic trauma in children	2	12
9: Oct 31-Nov 6	Multiple Trauma	Antifibrinolytic drugs for acute traumatic injury	49	59
10: Nov 7-13	Gastroenteritis	Oral versus intravenous rehydration for treating dehydration due to gastroenteritis in children	14	24
11: Nov 14-20	Chronic Pain	Psychological therapies for the management of chronic and recurrent pain in children and adolescents	76	86
12: Nov 21-27	Gastroenteritis	Antiemetics for reducing vomiting related to acute gastroenteritis in children and adolescents	42	52
13: Nov 28-Dec 4	Multiple Trauma	Emergency ultrasound-based algorithms for diagnosing blunt abdominal trauma	3	13
14: Dec 5-11	Croup	Glucocorticoids for croup	16	26
15: Dec 12-18	Fractures	Interventions for treating femoral shaft fractures in children and adolescents	4	14
16: Dec 19-25	Croup	Heliox for croup in children	16	26

4. Our promotion will increase 2016 overall site visits to https://cochranechild.wordpress.com/ to 6077[3] views

Year:	**2013**	**2014**	**2015**	**2016 (to date – Aug 15)**	**2016 (goal – by Dec 25)**
Views:	108	1192	7325	1453	6077
Posts Published:	3	9	26	0	16

5. Our promotion will increase overall monthly site visits to www.trekk.ca by 10%

Month:	**Baseline (Jul 2016)[4]**	**Baseline (Aug 2016)**	**Average for July/Aug**	**Goal (Sept 2016)**	**Goal (Oct 2016)**	**Goal (Nov 2016)**	**Goal (Dec 2016)**
Sessions:	1,292	1,464	1,378	1,516	1,516	1,516	1,516
Page Views:	3,419	5,865	4,642	5,106	5,106	5,106	5,106

[3] For the 35 total posts to the Cochrane Wordpress blog, there were 10,109 site visits. We calculated average views per post as 289. The site view goal for 2016 is based on an estimate of 289 views for each new post (16 x 289 = 4624) added to the 2016 baseline views of 1453.

[4] Revised Sept 26th 2016 based on revised data from TREKK Central Administration

Users:	856	930	893	982	982	982	982

6. Our promotion will increase views for previously published TREKK KT tools for croup by 10%, and by an equivalent of 10%[5] for newly published KT tools for gastroenteritis and chronic pain. We will coordinate our promotion to correspond with the CIHR IHDCYH Talks video competition for 2016: http://www.cihr-irsc.gc.ca/e/49305.html

PEM Topic	KT tool	URL	TREKK Report	Baseline (Aug 15)	Goal (Dec 25)
Croup	eBook	http://croup.trekk.ca/book/	http://trekk.ca/external_resources/1161	91 total clicks	100 clicks
	YouTube video	https://youtu.be/LJmCs4ykWHE	N/A	3682 views	4050 views
Gastro	eBook	TBD	TBD	N/A	100 clicks
	YouTube video	https://youtu.be/t3UkBk62AJE	N/A	N/A	368 views
Chronic Pain	YouTube video	TBD	TBD	N/A	368 views

Strategy:
Each week, we will reproduce a Cochrane summary as a post on https://cochranechild.wordpress.com/. Each post will also include:

- A blog shot image
- Citations and traceable links to TREKK KT tools & BLRs in English & French (if applicable)
- A citation and a traceable link to the Cochrane review
- A citation with a traceable link to the TREKK Evidence Repository (if applicable)

An initial post (see appendix) will be published during the week of August 29th, describing briefly the Child Health Emergency Medicine Campaign. Promoting tweets will accompany the introductory post.

We will promote the following reviews, BRLs and KT tools according to the schedule below:

Week	Topic	Review	BLR	KT tool	Note
1: Sept 5-11	Multiple Trauma	Thromboprophylaxis for trauma patients	Multisystem Trauma	None	
2: Sept 12-18	Fractures	Surgical interventions for diaphyseal fractures of the radius and ulna in children	Fractures	None	Lack of evidence
3: Sept 19-25	Multiple Trauma	Prophylactic antibiotics for penetrating abdominal trauma	Multisystem Trauma	None	Lack of evidence

[5] Based on the number of page views for the croup YouTube video and total clicks for the croup ebook.

4: Sept 26-Oct 2	Croup	Nebulized epinephrine for croup in children	Croup	- eBook - YouTube video	
5: Oct 3-9	Multiple Trauma	Selective computed tomography (CT) versus routine thoracoabdominal CT for high-energy blunt-trauma patients	Multisystem Trauma	None	Lack of evidence
6: Oct 10-16	Fractures	Antibiotics for preventing infection in open limb fractures	Fractures	None	
7: Oct 17-23	Intussusception	Vaccines for preventing rotavirus diarrhoea: vaccines in use	Intussusception	None	National Infection Control Week
8: Oct 24-30	Multiple Trauma	Non-operative versus operative treatment for blunt pancreatic trauma in children	Multisystem Trauma	None	Lack of evidence
9: Oct 31-Nov 6	Multiple Trauma	Antifibrinolytic drugs for acute traumatic injury	Multisystem Trauma	None	Canadian Intensive Care Week
10: Nov 7-13	Gastroenteritis	Oral versus intravenous rehydration for treating dehydration due to gastroenteritis in children	Gastroenteritis	- eBook - YouTube video	Video competition
11: Nov 14-20	Chronic pain	Psychological therapies for the management of chronic and recurrent pain in children and adolescents	None	- YouTube video	- National Child Day (Nov 20) - Video competition
12: Nov 21-27	Gastroenteritis	Antiemetics for reducing vomiting related to acute gastroenteritis in children and adolescents	Gastroenteritis	-ebook - YouTube video	Video competition
13: Nov 28-Dec 4	Multiple Trauma	Emergency ultrasound-based algorithms for diagnosing blunt abdominal trauma	Multisystem Trauma	None	Lack of evidence
14: Dec 5-11	Croup	Glucocorticoids for croup	Croup	- eBook - YouTube video	
15: Dec 12-18	Fractures	Interventions for treating femoral shaft fractures in children and adolescents	Fractures	None	
16: Dec 19-25	Croup	Heliox for croup in children	Croup	- eBook - YouTube video	

Twitter Promotion:
We will promote the blog post, its Cochrane review, the TREKK BLR and any applicable KT tool with tweets and re-tweets from @Cochrane_Child, @TREKKca, @arche4evidence, and @TripChildHealth

Account	Tweets will ink to:	Tweets per day	ReTweets per day	Total Tweets & Retweets per week	Total Tweets & ReTweets for the promotion
@Cochrane_Child	- Blog - Cochrane Review	3	3	42	672
@TREKKca	- Blog - TREKK products - Cochrane Review[6]	3	3	42	672
@arche4evidence	- Blog - TREKK products	0	1	7	112
@TRIPChildHealth	- Blog - TREKK products	0	1	7	112
	Totals:	**6**	**8**	**98**	**1568**

Scheduling:
We will use Buffer (https://buffer.com/) to identify peak traffic times and to schedule tweets for all Twitter accounts. We will write tweets in advance and pre-schedule every Monday morning for 16 weeks starting on September 5th. To help keep our project team on schedule, we will use a shared Google Calendar to list all project tasks and deadlines.

Blog shots & Images:
We will include images in all blog posts and Twitter messages. A maximum of 3 key messages from the Cochrane summaries will be integrated into the blog shots. See appendix for sample key messages. Images will be identified and modified from files supplied by Cochrane UK, ShutterStock, the TREKK KT tools project team, and other web sites containing public domain images (Wikimedia Commons, Flikr, Vecteezy, etc.). See appendix for an example blog shot and image-based tweet.

We will create 16 blog shots (1 per week) to be published on the blog and disseminated in at least one Twitter message per day. We will also create image-based tweets using the Pablo image editor through Buffer for tweets promoting Cochrane reviews. We will use TREKK-provided images to promote TREKK BLRs or TREKK KT tools. We will produce blog shots with black text on a light coloured background, using different coloured backgrounds for each topic area:

- Multiple trauma – Green
- Fractures – Grey
- Croup – Purple
- Intussusception – Orange
- Gastroenteritis – Blue

[6] We will tweet about the Cochrane Review when there is no BLR or KT tool to promote

As images for some topic areas (i.e., multiple trauma) may be inappropriate for our target audience of health consumers, we will use general emergency medicine images (e.g., ambulances, IV bags, ultrasound machines, x-rays, etc.) instead of images of injured children.

Audience Engagement

Initial Cochrane Author Contact:
We will contact lead authors and the Cochrane Review Groups responsible for the 16 selected reviews during the week of August 29th. We will share our intention to promote their review via social media, and provide the dates of the promotion. We will also invite them to check the @Cochrane_Child twitter account during the week of the review in order to re-tweet our promotional messages, and invite them to provide a quotation for the blog site. Please see a sample email message as an appendix below.

Initial TREKK Content Adviser Contact:
During the week of August 29th, we will also contact the TREKK content advisers who selected the promoted Cochrane reviews for their topic areas in the TREKK Evidence Repository, and who authored the promoted BLRs. We will share our intention to promote their selected Cochrane review and their BLR, and invite them to re-tweet our messages. They will also be invited to provide a quote, about why they selected the Cochrane review and the value of their BLR for health professionals. Please see a sample email as an appendix below.

Communication during the Promotion:
Twitter account moderators will reply promptly to messages about promoted content. Sandra or Robin will reply to comments about Cochrane content; Erin will reply to comments about TREKK content. Sandra, Erin and Robin will notify one another of comments needing moderation from re-tweeted content from the other's account.

Our replies will be positive, and aim to promote further engagement with Cochrane Child Health and TREKK. We will not dispense clinical information in our replies, but commit to sharing comments with our team. Below are anticipated scenarios for audience communication and sample responses:

Scenario	Description	Sample response
1. Spam	Advertisement as reply	Ignore, or block account (if it happens more than once).
2. Troll	Intentionally aggravating or offensive comments intended to elicit a response	Block account.
3. Praise	Comment in support of TREKK or Cochrane Child Health	Thanks and a link to more information (e.g., TREKK e-update sign up: http://trekk.ca/bulletins/1/subscriptions/new)

4. Complaint	Comment disagreeing with content	Thanks and a link for "how we select our evidence" (TREKK) or more information about the process of creating SRs (Cochrane)
5. Suggestion	Comment promoting research evidence that enhances/contradicts our messaging	Thanks and a statement that we'll pass their suggestion along to our team

Assessment:

We will use the following indicators and tools to assess each objective:

Objective	Indicator	Tool
1. Increase followers for the @Cochrane_Child and @TREKKca Twitter accounts by 15%	Number of followers	Twitter account information
2. Increase total clicks for the following TREKK BLRs by 10% for the 1st promotional week, and then by 5% for each additional week	- Click counts - Document views	- bit.ly reports - trekk.ca reports
3. Increase Altmetric.com scores for each Cochrane review by 10 points	- Altmetric.com scores	- Altmetric.com reports
4. Increase 2016 overall site visits to https://cochranechild.wordpress.com/ to 6077 views	Number of site visits	Wordpress account information
5. Increase overall monthly site visits to www.trekk.ca by 10%	Number of site visits	trekk.ca reports
6. Increase views for previously published TREKK KT tools for croup by 10%, and by an equivalent of 10% for newly published KT tools for gastroenteritis and chronic pain	- Click counts - Views	- bit.ly reports - trekk.ca reports

We will also collect "click count" data using @arche4evidence's bit.ly (https://bitly.com/) account for all blog posts, Cochrane reviews, and TREKK products promoted through Twitter and Wordpress. We will use Excel to record data once a week (30 days after the links are created). Click count data collection will start on October 5th and continue weekly until February 1st, 2017.

Knowledge Dissemination:

We will collect data in early February and prepare an internal report for our stakeholders at TREKK and Cochrane Child Health. Key findings from the report will be disseminated via a poster to be presented at Pediatric Research Day (May 2017) and WCHRI Research Day (Nov 2017). The poster will be adapted into an infographic and shared via Twitter between May and August 2017. A manuscript of the research findings will be submitted to an academic journal in 2018. Potential journals include: BMJ Open, JMIR, Health Communication, and the Journal of Health Communication.

Appendix: Introductory blog post

Sharing Research Knowledge through Social Media: the Fall 2016 Child Health Emergency Medicine Campaign

We are pleased to announce the Fall 2016 Child Health Emergency Medicine social media campaign. Building on a partnership between Cochrane Child Health and TRanslating Emergency Knowledge for Kids (TREKK), the 16-week campaign aims to promote the highest quality of health care for children and families by disseminating Cochrane evidence for pediatric emergency medicine.

Each week, we will share blog posts featuring plain language summaries of selected Cochrane systematic reviews, and associated TREKK evidence products suitable for families, health professionals and researchers. Our focus topics for this campaign include: fractures, intussusception, multisystem trauma, gastroenteritis, and croup.

Cochrane authors have collaborated globally to identify and synthesize evidence to answer pertinent questions about pediatric emergency medicine. Our aim is to expand the reach of these works by using social media as a platform to share their reviews. Be sure to check back each Monday from September 5th to December 19th for a new blog post. Also consider following our tweets from @Cochrane_Child and @TREKKca, and sharing the selected evidence products from www.trekk.ca

Appendix: Sample key messages

Week 1: **Thromboprophylaxis for trauma patients**

1. Unwanted blood clots (thromboembolism) are a frequent complication in people who have experienced physical trauma.
2. Evidence of the effectiveness of interventions to prevent thromboembolism (thromboprophylaxis) was reviewed in 16 studies involving 3,005 people.
3. Evidence supports the use of thromboprophylaxis to prevent clots in veins in lower extremities (deep vein thrombus) for people with severe trauma.

Appendix: Sample blog shot & image-based tweet

Appendix: Sample E-mail for Cochrane Corresponding Authors

Dear Dr. [insert],

This fall, Cochrane Child Health, in collaboration with Translating Emergency Knowledge for Kids (TREKK), will launch a 16-week social media campaign. The Child Health Emergency Medicine Campaign aims to promote highest quality health care for children and families by disseminating Cochrane evidence for pediatric emergency medicine. Our campaign includes weekly blog posts featuring the plain language summaries of selected Cochrane systematic reviews, and Twitter messages promoting those summaries and associated TREKK evidence products.

We are contacting you because your published Cochrane Review, "[insert title]" has been selected to be featured in our campaign. If you have a Twitter account, please consider promoting messages about your review from @Cochrane_Child during the week of [insert date].

Thank you for your valued contribution to the evidence-base in pediatric emergency medicine. We welcome your input to enhance our campaign, and would be delighted to incorporate a summary statement about your systematic review in our messages. Please respond to this email with your statement before [insert date], and we will include it in the campaign.

Kind Regards,

Appendix: Sample E-mail for TREKK Content Advisers

Dear Dr. [insert],

This fall, Translating Emergency Knowledge for Kids (TREKK), in collaboration with Cochrane Child Health, will launch a 16-week social media campaign. The Child Health Emergency Medicine Campaign aims to promote highest quality health care for children and families by disseminating TREKK and Cochrane evidence for pediatric emergency medicine. Our campaign includes weekly blog posts featuring the plain language summaries of Cochrane systematic reviews selected for topic areas in the TREKK Evidence Repository, and Twitter messages promoting those summaries and associated TREKK evidence products, including our Bottom line Recommendations (BLRs).

We are contacting you because your BLR, "[insert title]" and [this/these] Cochrane review/s from your topic area, "[insert title/s]" have been selected to be featured in our campaign. If you have a Twitter account, please consider promoting messages about the review and/or your BLR from @TREKKca or @Cochrane_Child during the week/s of [insert date/s].

We welcome your input to enhance our campaign, and would be delighted to incorporate a summary statement about the review and why you selected it for your TREKK topic area in the Evidence Repository, or about your BLR and its value for health professional. Please respond to this email with your statement before [insert date], and we will include it in the campaign.

Kind Regards,

Supplementary File 2. Sample blog shot images

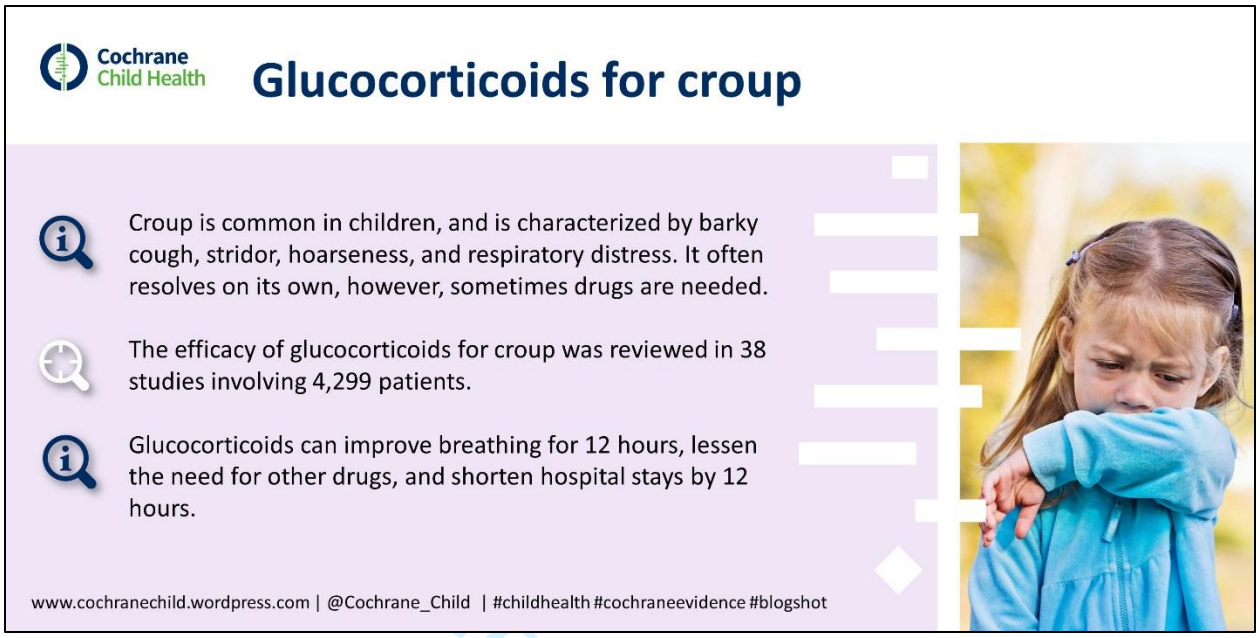

Figure 1. Sample blog shot image for croup

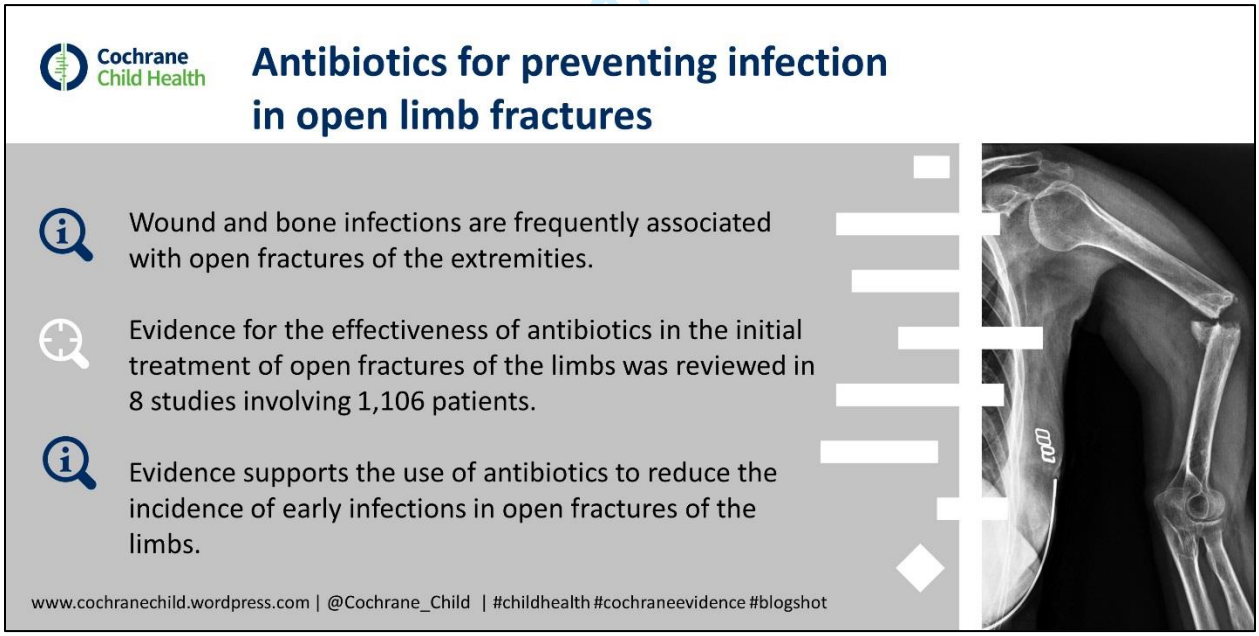

Figure 2. Sample blog shot image for fractures

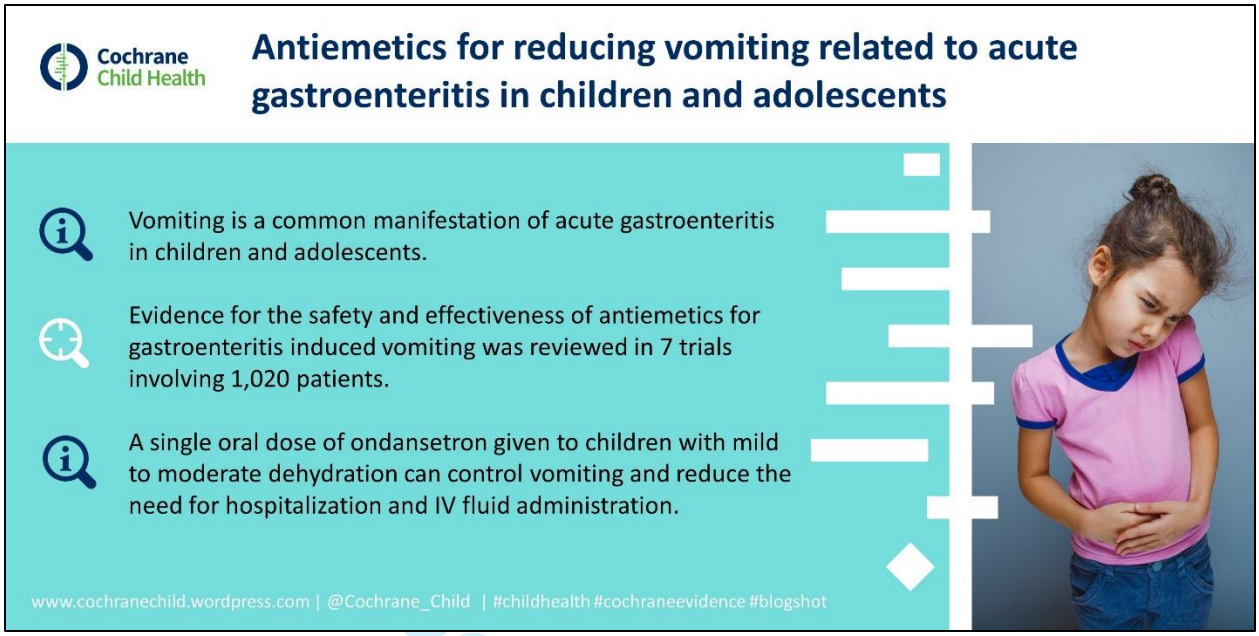

Figure 3. Sample blog shot image for gastroenteritis

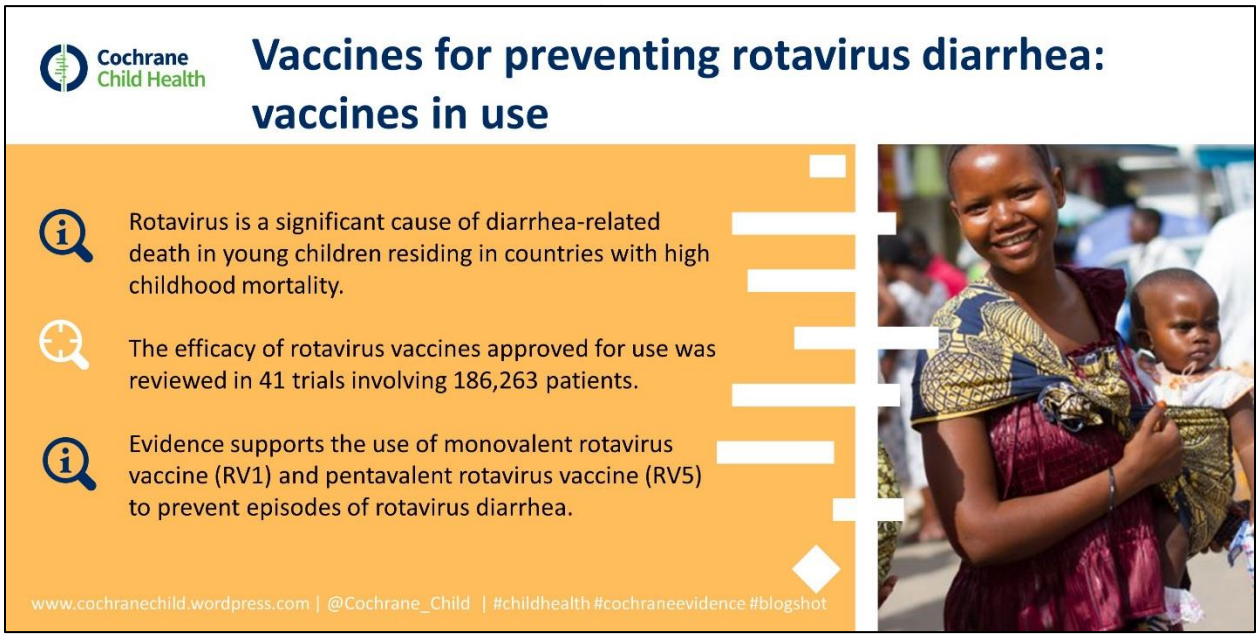

Figure 4. Sample blog shot image for intussusception

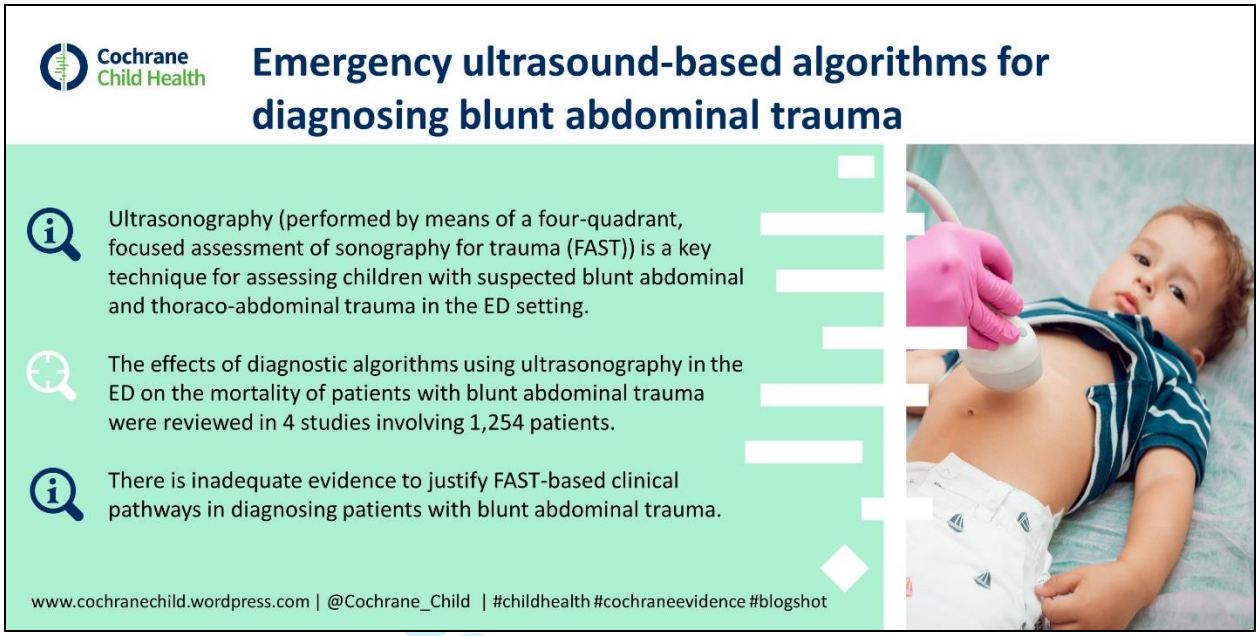

Figure 5. Sample blog shot image for multisystem trauma

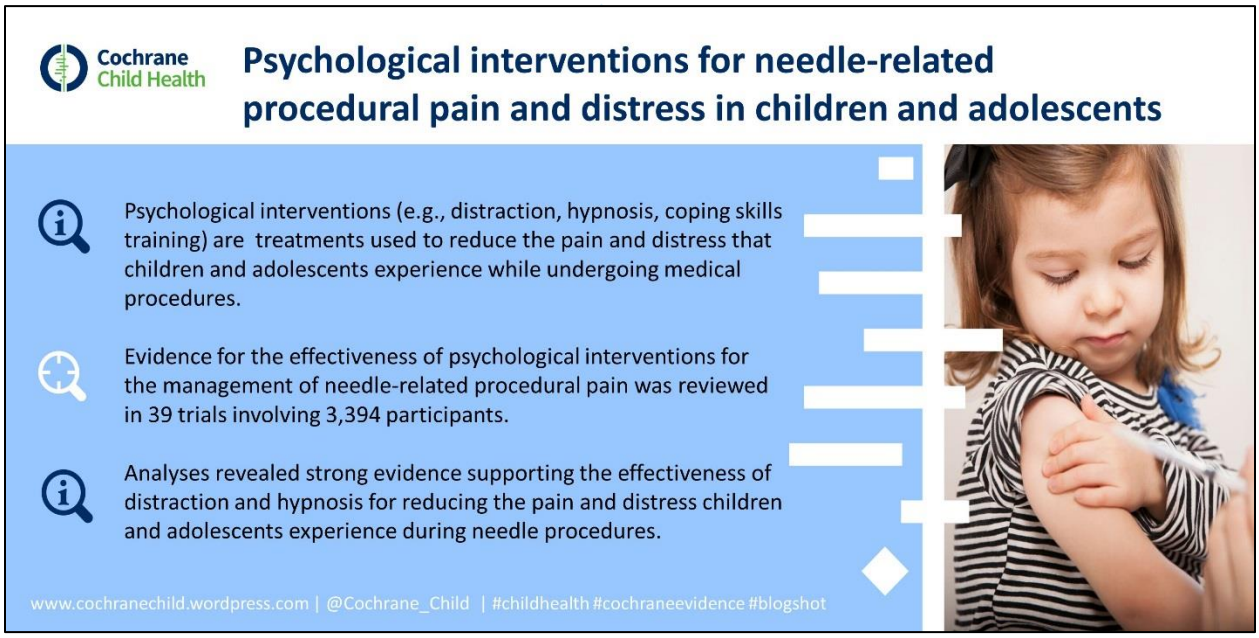

Figure 6. Sample blog shot image for procedural pain

Supplementary File 3. Sample image-based tweets promoting the Cochrane systematic reviews

Figure 1. Sample image-based tweet for croup

Figure 2. Sample image-based tweet for fractures

Figure 3. Sample image-based tweet for gastroenteritis

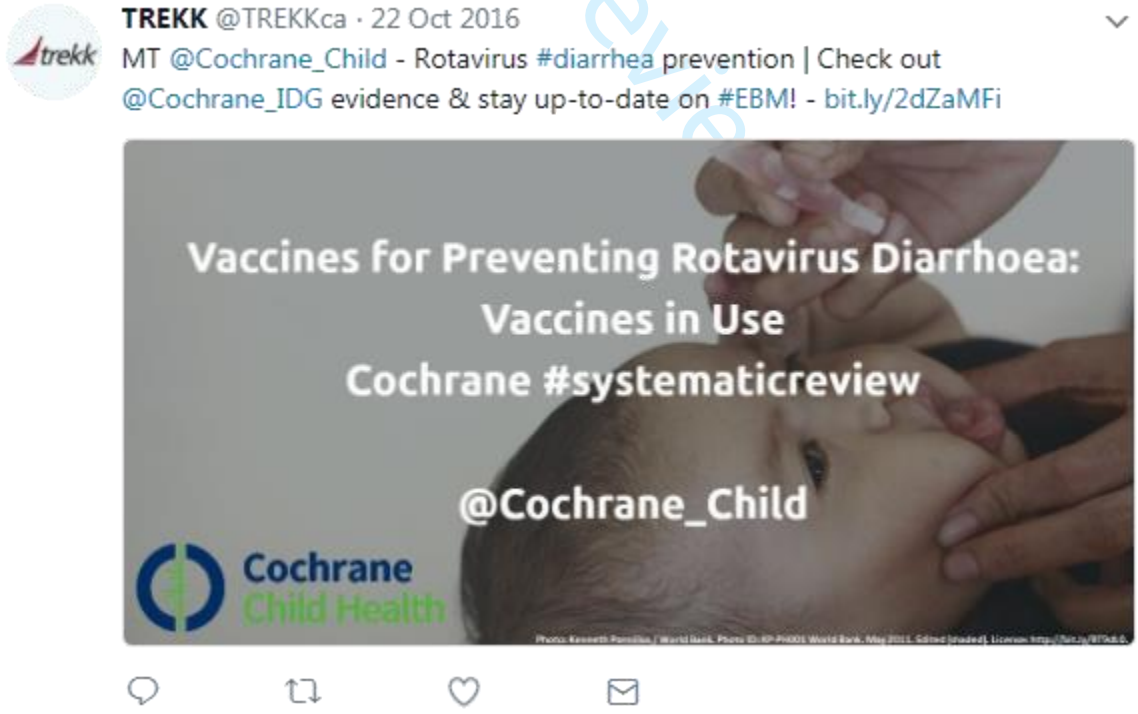

Figure 4. Sample image-based tweet for intussusception

Figure 5. Sample image-based tweet for multisystem trauma

Figure 6. Sample image-based tweet for procedural pain

Supplementary File 4. Weekly user interaction with the @TREKKca and @Cochrane_Child Twitter accounts

Week	Topic	@TREKKca, N				@Cochrane_Child, N			
		Retweets	Favourites	Impressions	Engagements	Retweets	Favourites	Impressions	Engagements
1	Multisystem Trauma	41	25	11,621	135	17	19	10,600	140
2	Fractures	28	23	11,600	324	40	37	17,014	389
3	Multisystem Trauma	27	27	8,450	281	15	13	11,777	154
4	Croup	60	39	14,059	293	104	59	24,106	658
5	Multisystem Trauma	23	21	9,503	145	17	14	10,255	156
6	Fractures	18	17	9,162	117	50	26	16,913	336
7	Intussusception	26	24	11,821	183	89	43	19,181	408
8	Multisystem Trauma	10	15	8,422	289	27	28	15,008	185
9	Multisystem Trauma	41	34	11,957	274	46	24	15,030	269
10	Gastroenteritis	53	40	15,122	362	68	44	17,331	497
11	Procedural Pain	44	42	17,230	420	109	74	23,756	622
12	Gastroenteritis	36	26	10,816	232	117	65	25,141	838
13	Multisystem Trauma	35	30	11,067	284	34	26	12,692	278
14	Croup	39	21	10,764	243	85	67	18,672	611
15	Fractures	41	26	12,498	218	35	31	18,245	261
16	Croup	47	36	17,982	380	41	23	17,452	302
Total		569	446	192,074	4,180	894	593	273,173	6,104
Mean ±SD per week		36 ±13	28 ±8	12,005 ±2,843	261 ±88	56 ±35	37 ±20	17,073 ±4,560	382 ±209

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	Page(s)
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-5
Objectives	3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	5-9
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5-10
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	n/a
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	9-10
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	9-10
Bias	9	Describe any efforts to address potential sources of bias	n/a
Study size	10	Explain how the study size was arrived at	n/a
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	10
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	10
		(*b*) Describe any methods used to examine subgroups and interactions	n/a
		(*c*) Explain how missing data were addressed	n/a
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	n/a
		(*e*) Describe any sensitivity analyses	n/a
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	n/a
		(b) Give reasons for non-participation at each stage	n/a
		(c) Consider use of a flow diagram	n/a
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	n/a
		(b) Indicate number of participants with missing data for each variable of interest	n/a
Outcome data	15*	Report numbers of outcome events or summary measures	9-15
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear	10-15

		which confounders were adjusted for and why they were included	
		(*b*) Report category boundaries when continuous variables were categorized	n/a
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	n/a
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	n/a
Discussion			
Key results	18	Summarise key results with reference to study objectives	16
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	3
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	16-18
Generalisability	21	Discuss the generalisability (external validity) of the study results	3
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	19-20

BMJ Open

Dissemination of evidence in pediatric emergency medicine: a quantitative descriptive evaluation of a 16-week social media promotion

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Primary Subject Heading:	Communication
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Keywords:	social media, Twitter, blogs, ACCIDENT & EMERGENCY MEDICINE, pediatrics, knowledge dissemination

Title. Dissemination of evidence in pediatric emergency medicine: a quantitative descriptive evaluation of a 16-week social media promotion

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Word count for main text: 4,602

ABSTRACT

Objectives. TRanslating Emergency Knowledge for Kids (TREKK) and Cochrane Child Health collaborate to develop knowledge products on pediatric emergency medicine topics. Via a targeted social media promotion, we aimed to increase user interaction with the TREKK and Cochrane Child Health Twitter accounts, and the uptake of TREKK Bottom Line Recommendations (BLRs) and Cochrane systematic reviews (SRs).

Design. Quantitative descriptive evaluation.

Setting. We undertook this study and collected data via the Internet.

Participants. Our target users included online healthcare providers and health consumers.

Intervention. For 16 weeks we used Twitter accounts (@TREKKca and @Cochrane_Child) and the Cochrane Child Health blog to promote 6 TREKK BLRs and 16 related Cochrane SRs. We published 1 blog post and 98 image-based tweets per week.

Primary and secondary outcome measures. The primary outcome was user interaction with @TREKKca and @Cochrane_Child. Secondary outcomes were visits to TREKK's website and the Cochrane Child Health blog, clicks to and views of the TREKK BLRs, and Altmetric scores and downloads of Cochrane SRs.

Results. Followers to @TREKKca and @Cochrane_Child increased by 24% and 15%, respectively. Monthly users of TREKK's website increased by 29%. Clicks to the TREKK BLRs increased by 22%. The BLRs accrued 59% more views compared to the baseline period. The 16 blog posts accrued 28% more views compared to the eight previous months when no new posts were published. The Altmetric scores for the Cochrane SRs increased by ≥10 points each. The mean number of full text downloads for the promotion period was higher for 9 and lower for 7 SRs compared to the 16-week average for the previous year (mean difference (SD), +4.0 (22.0%)).

Conclusions. There was increased traffic to TREKK knowledge products and Cochrane SRs during the social media promotion. Quantitative evidence supports blogging and tweeting as dissemination strategies for evidence-based knowledge products.

Keywords: social media, Twitter, blogs, emergency medicine, pediatrics, knowledge dissemination, knowledge translation, knowledge synthesis, systematic reviews

STRENGTHS AND LIMITATIONS OF THIS STUDY

- We undertook a carefully planned social media promotion using multiple platforms (Twitter accounts and blogs), allowing us to reach a broad and diverse audience.
- Our study provides a useful benchmark for other groups wanting to undertake similar endeavours.
- In the absence of guidance, we based our a priori goals on historical measures of performance, and selected quantitative social media metrics to measure their achievement.
- Our study does not account for the organic growth of Twitter followership and website viewership.
- We cannot ascertain to what extent our own tweets contributed to increases in Altmetric scores.

BACKGROUND

The slow or incomplete translation of evidence into clinical practice undermines healthcare professionals' (HCPs') ethical obligation to provide patients with the highest standard of care while avoiding undue risk of harm.[1] Globally and across medical specialties, evidence-to-practice gaps that lead patients to receive substandard care nevertheless remain common. A systematic review of survey data found that median adherence to evidence-based clinical practice guidelines was just 36% (interquartile range, 30-56%).[2] For children, the majority of whom are cared for in non-specialty, general emergency departments,[3,4] the inadequate awareness and adoption of age-specific standards of care is especially problematic.[5-7] Targeted knowledge translation strategies may contribute to improving HCPs' awareness and application of evidence-based guidance for common acute childhood conditions.

Social media platforms are a convenient means to disseminate evidence-based health information. Among other venues, freely accessible platforms like Twitter and Facebook are increasingly being used by HCPs and patients to seek out information and communicate online.[8,9] Along with advances in the use of social media in healthcare settings, free open-access medical education (FOAM) has grown rapidly in the past decade.[10-12] As part of the FOAM movement, HCPs can create free and openly available educational resources which may then be rapidly disseminated through social media to colleagues and trainees.[10,11] Sharing evidence-based resources on social media platforms may also improve patient and public access to high quality health information.[13,14]

TRanslating Emergency Knowledge for Kids (TREKK, http://trekk.ca) is a Canadian knowledge mobilisation initiative driven by a network of researchers, HCPs, and consumers committed to increasing the uptake of high-quality pediatric emergency medicine evidence.[15,16] TREKK creates open-access, evidence-based knowledge products to address the information and education needs of HCPs. These include: an Evidence Repository populated with expert-selected guidelines, Cochrane systematic reviews, and other key studies; and Bottom Line Recommendations (BLRs) that provide summaries of key facts and recommendations for the diagnosis and treatment of acute childhood conditions.[15,16]

TREKK collaborates with Cochrane Child Health (http://childhealth.cochrane.org/) by highlighting Cochrane evidence on pediatric emergency medicine topics within its knowledge products. Cochrane systematic reviews bring together all available research on healthcare interventions, providing the best evidence for informed clinical decision-making. Specific to pediatric healthcare, Cochrane Child Health

works with Cochrane to advocate for systematic reviews that reflect the needs of children, facilitate systematic reviews on child health topics, develop methods for synthesizing child-relevant health research, and translate Cochrane knowledge to relevant stakeholders.[17]

TREKK's Twitter account (@TREKKca) was established in December 2011. Although TREKK aims to serve Canadian HCPs and families, much of the content disseminated via its Twitter account is universally relevant. The Cochrane Child Health Twitter account (@Cochrane_Child) was established in September 2013 and aims to serve an international audience of researchers and HCPs. The Cochrane Child Health blog (https://cochranechild.wordpress.com/), established in November 2014, aims to translate child-relevant Cochrane evidence to HCPs and families. Both Twitter accounts and the blog are managed out of the Alberta Research Centre for Health Evidence (ARCHE), University of Alberta, Canada.

We used social media to disseminate and promote the uptake of TREKK knowledge products and Cochrane systematic reviews on pediatric emergency medicine topics. ARCHE researchers and staff are involved in the administration of Cochrane Child Health and in the development and dissemination of TREKK knowledge products for HCPs, patients, and families. Because Cochrane systematic reviews provide the foundation for many of the TREKK knowledge products, including the BLRs for HCPs, we promoted the reviews and TREKK knowledge products concurrently to advocate for the use and improve the uptake of these complementary products. Via a 16-week promotion, we aimed to increase: 1. user interaction with the TREKK and Cochrane Child Health Twitter accounts; 2. visits to the TREKK website and clicks to and views of TREKK BLRs; and 3. visits to the Cochrane Child Health blog and Altmetric scores and downloads for the Cochrane systematic reviews.

METHODS

Promotion Summary

We ran a 16-week social media promotion from September 5 to December 25, 2016 using blog posts and tweets. Our primary audience for the promotion was HCPs and trainees. Our secondary audience was health consumers providing care to children (parents, families). The promotion followed an a priori protocol (**Supplementary File 1**).

In addition to our overarching objectives, we decided on specific goals that we aimed to achieve by the end of the promotion (**Box 1**). Our goals were based on benchmark performance indicators established during a previous social media promotion undertaken by our centre in the Fall of 2015 to promote Cochrane summaries, and on historical performance of the blog. During the Fall 2015 promotion,

followers to @TREKKca increased by 15% (from 452 to 521) and the Altmetric scores for the promoted Cochrane systematic reviews increased by a mean 10 points. Between inception (2013) and 2015, 35 posts were published on the Cochrane Child Health Blog. These posts received 10,109 views, or 289 views per post. We therefore aimed to accrue 289 new views per blog post during the promotional period, added to the baseline views for 2016 (1453 views). In the absence of a priori performance data, we set modest goals for visits to the TREKK website and clicks to the TREKK BLRs.

Box 1. Specific goals for the social media promotion

1. Increase followers of the TREKK and Cochrane Child Health Twitter accounts by 15%.
2. Increase site visits to the TREKK website by 10%.
3. Increase clicks to the TREKK BLRs by 10% for the first promotional week, and by 5% in each additional week.
4. Increase site visits to the Cochrane Child Health blog to 6,077 views.
5. Increase Altmetric (http://altmetric.com) scores for the promoted Cochrane systematic reviews by 10 points each.

Table 1 shows our weekly promotion schedule. TREKK's national needs assessment informed the topics that we selected. As part of the needs assessment, 1,471 HCPs from 32 Canadian general emergency departments completed surveys on the pediatric emergency medicine topics for which information for evidence-based care would be of interest.[16,18] From the priority list of topics from the survey, we selected those where the TREKK Evidence Repository contained a relevant Cochrane systematic review (croup, fractures, gastroenteritis, intussusception, multisystem trauma, and procedural pain). This allowed us to promote TREKK's knowledge products and Cochrane Child Health evidence concurrently.

Table 1. Detailed weekly social media promotion schedule

Week	TREKK BLR	Cochrane systematic review
September 5-11	Multisystem Trauma	Thromboprophylaxis for trauma patients
September 12-18	Fractures	Surgical interventions for diaphyseal fractures of the radius and ulna in children
September 19-25	Multisystem Trauma	Prophylactic antibiotics for penetrating abdominal trauma
September 26-October 2	Croup	Nebulized epinephrine for croup in children
October 3-9	Multisystem Trauma	Selective computed tomography (CT) versus routine thoracoabdominal CT for high-energy blunt-trauma patients
October 10-16	Fractures	Antibiotics for preventing infection in open limb fractures
October 17-23	Intussusception	Vaccines for preventing rotavirus diarrhoea: vaccines in use
October 24-30	Multisystem Trauma	Non-operative versus operative treatment for blunt pancreatic

Week	TREKK BLR	Cochrane systematic review
		trauma in children
October 31-November 6	Multisystem Trauma	Antifibrinolytic drugs for acute traumatic injury
November 7-13	Gastroenteritis	Oral versus intravenous rehydration for treating dehydration due to gastroenteritis in children
November 14-20	Procedural Pain	Psychological interventions for needle-related procedural pain and distress in children and adolescents
November 21-27	Gastroenteritis	Antiemetics for reducing vomiting related to acute gastroenteritis in children and adolescents
November 28-December 4	Multisystem Trauma	Emergency ultrasound-based algorithms for diagnosing blunt abdominal trauma
December 5-11	Croup	Glucocorticoids for croup
December 12-18	Fractures	Interventions for treating femoral shaft fractures in children and adolescents
December 19-25	Croup	Heliox for croup in children

BLR: Bottom Line Recommendation

Blog Posts

Throughout the promotion, we published posts on the Cochrane Child Health blog. We published an introductory blog post during the week of August 29, 2016 that briefly described our promotion. Subsequently, we posted one blog post per week. Each blog post contained: the plain language summary for a Cochrane systematic review, published with permission from Wiley; a "blog shot" image (image-based summary containing three key messages from the Cochrane systematic review); and citations and traceable links to TREKK knowledge products (Evidence Repository and BLRs) and the full text of the Cochrane systematic review. **Supplementary File 2** includes sample blog shot images.

The intent of our blog posts was to provide concise, informative summaries of the findings of child health Cochrane systematic reviews that would be more appealing to our target audience. Freely accessible plain language summaries were introduced with the aim of improving the uptake of Cochrane systematic reviews by overcoming barriers including: the length of the reviews and the use of scientific jargon, which make them impractical to read and difficult to understand for many HCPs and health consumers; and challenges related to the technical and financial access to the full text documents, which are not open access.[19] Studies in the specialties of surgery and radiology have shown that blogging about research publications is an effective means to improve the dissemination and reach of the key messages and of the publications themselves.[20,21]

Tweets

We published 98 tweets per week from four Twitter accounts: @TREKKca, @Cochrane_Child, @arche4evidence (ARCHE), and @TRIPChildHealth (Turning Research Into Practice (TRIP) database for high quality clinical research). These tweets included traceable links to the relevant TREKK knowledge products, the Cochrane systematic review, and the Cochrane Child Health blog.

We used Buffer (https://buffer.com) to pre-schedule the tweets for publication at peak-traffic times for all Twitter accounts. We included images in each tweet. These included the aforementioned blog shots, as well as images modified from files supplied by Cochrane UK, ShutterStock, the TREKK knowledge products development team, and other websites containing public domain images (e.g., Wikimedia Commons, thenounproject.com). We also used the Pablo image editor in Buffer (https://pablo.buffer.com/) to create images to promote the Cochrane systematic reviews. During weeks when sensitive topics were covered (e.g., multisystem trauma), we used general emergency medicine images (e.g., ambulances, medical equipment) as to inform our audience without posing undue discomfort. **Supplementary File 3** shows samples of our image-based tweets.

Audience Engagement

During the week of August 29, 2016, we e-mailed the corresponding authors and the Cochrane Review Groups (who manage the editorial processes associated with the production and publication of Cochrane systematic reviews) for each of the 16 Cochrane systematic reviews that we planned to promote. We informed them of our intention to promote their review via social media, provided the dates of the promotion, and encouraged them to check the Cochrane Child Health Twitter account and retweet our messages. We invited the corresponding authors to provide key messages for the blog. We also contacted TREKK content advisers and shared our intention to promote the TREKK knowledge products and Cochrane systematic reviews. We invited them to retweet our messages and provide a quote as to the value of the selected Cochrane systematic review and of their BLR for HCPs.

During the promotion, members of our team (RF, EH) monitored the Twitter accounts and replied to comments about the promoted content. Through our replies, we aimed to promote further engagement with TREKK and Cochrane Child Health. We did not dispense clinical information but committed to sharing the feedback with our team.

Patient Involvement

Although we did not involve patients in the development of the research questions or choice of outcome measures, health consumers were one of the target audiences for our promotion. We

incorporated features into the promotion that would enhance its appeal to health consumers, including the plain language summaries and blog shots. We disseminated the findings of this study to our followers, including health consumers, via image-based tweets from the four Twitter accounts.

Data Collection

Throughout the promotion, we collected indicators of engagement with our Twitter accounts, the uptake of TREKK BLRs and Cochrane systematic reviews, and visits to the TREKK website and Cochrane Child Health blog. We stored the data in a Microsoft Office Excel (v. 2016, Microsoft Corporation, Redmond, WA) workbook.

On August 15, 2016, we recorded the baseline Twitter followers for the @Cochrane_Child and @TREKKca accounts. One week following the completion of the promotion, we again recorded the total followers at each account. To measure user interaction with our accounts, each week during the promotion we collected metrics from the Twitter activity dashboard. These included the number of retweets (times a user retweeted our tweet), favourites (times a user favourited our tweet), impressions (times a user followed our accounts directly from a tweet), and engagements (times a user interacted with our tweet, i.e., clicked anywhere on the tweet, including retweets, replies, follows, likes, links, cards, hashtags, embedded media, username, profile photo, or tweet expansion).[22]

At baseline (average for the months of July and August 2016) and following the promotion (December 25, 2016), we collected the number of site visits to http://trekk.ca, measured by the number of sessions, page views, and users via Google Analytics (http://www.google.com/analytics/) reports. We collected the number of clicks to the TREKK BLRs using the @arche4evidence bit.ly (https://bitly.com) account. We collected click count data at baseline (August 15, 2016), and 30 days after the links to the BLRs were created (beginning on October 5, 2016 and weekly until February 1, 2017). We also collected the number of BLR document views at baseline (for the 16-week period before the promotion) and during the promotion period via reports produced by http://trekk.ca.

We collected the number of site visits to the Cochrane Child Health blog for the three years prior to the promotion, at baseline (year-to-date on August 15, 2016), and following the promotion (January 3, 2017) via information provided by WordPress (http://wordpress.com). We recorded Altmetric scores provided by http://altmetric.com for each of the systematic reviews at baseline (August 15, 2016) and at the end of the promotion (December 25, 2016). Altmetrics are non-traditional metrics that complement traditional citation impact metrics like the Impact Factor.[23] The score provided by altmetric.com is a

composite measure of an article's dissemination (i.e., readership), whereby more popular (or "buzzworthy") articles are scored more highly.[24] We also collected the total tweets for each of the Cochrane systematic reviews that we promoted via the Altmetric data provided by the Cochrane Library. Following the promotion, Wiley (the publisher for Cochrane systematic reviews) provided full text download data for the period of September 2015 to January 2017 for each of the systematic reviews that we promoted.

Data Analysis

We calculated descriptive statistics in Excel. We calculated the increase in Twitter followers by subtracting the baseline followers from the total followers at the end of the promotion for each account, and calculated the percent increase. We calculated the total and mean (standard deviation [SD]) retweets, favourites, impressions, and engagements per week, per topic, and overall for each account. We calculated the total users, sessions, and page views for the TREKK website for each promotion month, and the monthly average (SD). We calculated the total clicks to and views of the BLRs, and the percent increase in clicks and views from baseline, by topic and overall. We calculated the percent increase in visits to the Cochrane Child Health blog during the campaign compared to baseline. We calculated the point increase and percent increase in Altmetric scores, and percent change in the number of full text downloads for each Cochrane systematic review compared to baseline. We calculated the contribution of our own tweets to the total tweets for each Cochrane systematic review during the promotion. We compared all metrics to our a priori goals to determine which we had achieved.

RESULTS

User Interactions with @TREKKca and @Cochrane_Child

At baseline, the @TREKKca and @Cochrane_Child Twitter accounts had 633 and 1,934 followers, respectively. During the promotion, the @TREKKca account gained 149 followers (23.5% increase) to a total 782 followers. The @Cochrane_Child account gained 283 followers (14.6% increase) to a total 2,217 followers. We met our goal of increasing followers to each account by 15%.

Table 2 shows user interactions with each Twitter account, stratified by topic. Detailed weekly interaction data are available in **Supplementary File 4**. During the campaign, the @TREKKca account received a mean (SD) of 36 (13) retweets, 28 (8) favourites, 12,005 (2,843) impressions, and 261 (88)

engagements per week. The @Cochrane_Child account received a mean (SD) of 56 (35) retweets, 37 (20) favourites, 17,073 (4,560) impressions, and 382 (209) engagements per week.

TREKK Website and Knowledge Products

Table 3 shows the monthly site visits to the TREKK website. During the months of July and August 2016 (baseline), the TREKK website logged a mean of 893 users, 1,378 sessions, and 4,642 page views per month. During the promotion, the website logged a total of 4,608 users, 6,955 sessions, and 19,090 page views. This equated to a mean (SD) of 1,152 (151) users, 1,739 (217) sessions, and 4,773 (688) page views per month. On average, there were 29% more users, 26% more sessions, and 2.8% more page views per month during the promotion than at baseline. We surpassed our goal of increasing site visits to the website by 10% based on the number of users and sessions, but not on number of page views.

Table 4 shows the clicks to and views of the TREKK BLRs. At baseline (August 15, 2016), there were 1,429 clicks to the BLRs. During the promotion, the total number of clicks increased to 1,746 (317 click increase, 22.2%). For the 16-week period before the promotion (baseline), the BLRs were viewed 574 times. During the promotion, the BLRs accrued 915 views (314 [59.4%] more than baseline). There were more views during the promotion than during the baseline period for all of the BLRs (range, 23.3 to 116.0% more). We achieved our goal of increasing the clicks to all of the BLRs by 10% for the first promotional week, and 5% for each additional week promoted, except for those on croup and multisystem trauma.

Cochrane Child Health Blog and Cochrane Systematic Reviews

In the three years before the campaign (2013 to 2015), there were a total of 38 posts to the Cochrane Child Health Blog, and 8,625 site views (108, 1,192, and 7,325 views, respectively). From January 1 to August 15, 2016 there were no new posts and 1,453 site views. During the campaign, we published 17 new blog posts. The blog accrued 1,856 new views, to a total 3,309 views for the year 2016. We did not achieve our goal of increasing the number of views to the blog to 6,077 (289 views for each new post, based on performance from 2013 to 2015).

Table 5 shows the Altmetric scores and downloads for the Cochrane systematic reviews. The Altmetric scores for all of the promoted Cochrane systematic reviews increased during the campaign. The mean (SD) point increase was 16.7 (5.1). We achieved our goal of increasing the Altmetric scores for the Cochrane systematic reviews by 10 points each. Data from altmetric.com show that during the campaign our own tweets comprised 57.0% of all tweets related to the Cochrane systematic reviews that we

promoted (**Supplementary File 5**). Our own tweets comprised a larger proportion of the total tweets for the reviews on multisystem trauma (58 to 77%), fractures (59 to 68%), and intussusception (61%) compared to those on croup (44 to 55%), procedural pain (42%), and gastroenteritis (43 to 46%).

Compared to the mean number of downloads during a 16-week period for the year before the promotion (baseline), the total downloads for the Cochrane systematic reviews did not consistently increase during the promotion, and decreased for seven of 16 (44%) reviews. Compared to the baseline download rate, there was a mean (SD) 4.0 (22.0)% increase in the number of times the promoted Cochrane systematic reviews were downloaded.

Table 2. User interaction with the @TREKKca and @Cochrane_Child Twitter accounts, stratified by topic

Topic	Weeks promoted	@TREKKca, N total (N/week)[1]				@Cochrane_Child, N total (N/week)[1]			
		Retweets	Favourites	Impressions	Engagements	Retweets	Favourites	Impressions	Engagements
Croup	3	146 (49)	96 (32)	42,805 (14,268)	916 (305)	230 (77)	149 (50)	60,230 (20,077)	1,571 (524)
Fractures	3	87 (29)	66 (22)	33,260 (11,087)	659 (220)	125 (42)	94 (31)	52,172 (17,391)	986 (329)
Gastroenteritis	2	89 (45)	66 (33)	25,938 (12,969)	594 (297)	185 (93)	109 (55)	42,472 (21,236)	1,335 (668)
Intussusception	1	26 (26)	24 (24)	11,821 (11,821)	183 (183)	89 (89)	43 (43)	19,181 (19,181)	408 (408)
Multisystem Trauma	6	177 (30)	152 (25)	61,020 (10,170)	1,408 (235)	156 (26)	124 (21)	75,362 (12,560)	1,182 (197)
Procedural Pain	1	44 (44)	42 (42)	17,230 (17,230)	420 (420)	109 (109)	74 (74)	23,756 (23,756)	622 (622)
Total	16	569 (36)	446 (28)	192,074 (12,005)	4,180 (261)	894 (56)	593 (37)	273,173 (17,073)	6,104 (382)

[1]We based the weekly interactions on the total number of weeks that we promoted the topic.

Table 3. Overall monthly site visits to the TREKK website (trekk.ca)[1]

Time point	Users[2]	Sessions	Page views
Baseline[3]	893	1,378	4,642
September 2016	1,004	1,512	4,082
October 2016	1,133	1,736[4]	4,795
November 2016	1,362	2,031[4]	5,707[5]
December 2016	1,109	1,676[4]	4,506
Total	4,608	6,955	19,090
Mean ±SD	1,152 ±151	1,739 ±217	4,773 ±688

SD: standard deviation; TREKK: TRanslating Emergency Knowledge for Kids

[1]We aimed to increase the total monthly users, sessions, and page views for the website by 10%.

[2]We exceeded our goal of 928 users per month (total, 3,928 users) each month during the promotion.

[3]Average values for the months of July and August 2016.

[4]Months during which we exceeded our goal of 1,516 sessions per month (total, 6,065 sessions).

[5]Month during which we exceeded our goal of 5,106 page views per month (total, 20,424 page views).

Table 4. Clicks to and document views of the TREKK Bottom Line Recommendations, stratified by topic

BLR topic	Weeks promoted	Clicks,[1] N total				Document views,[2] N total		
		Baseline	Goal[3]	Total clicks (N/week)	Percent increase	Baseline	Total views (N/week)	Percent increase
Croup	3	438	526	489 (163)	11.6%	155	265 (88)	71.0%
Fractures	3	386	463	478 (159)	23.8%	176	217 (72)	23.3%
Gastroenteritis	2	298	343	386 (193)	29.5%	106	229 (115)	116.0%
Intussusception	1	150	165	186 (186)	24.0%	63	90 (90)	42.9%
Multisystem Trauma	6	157	212	207 (35)	31.8%	74	114 (19)	54.1%
Total[4]	15	1,429	1,709	1,746 (116)	22.2%	574	915 (61)	59.4%

BLR: Bottom Line Recommendation; TREKK: TRanslating Emergency Knowledge for Kids

[1]Clicks on bit.ly links. We collected baseline data on August 15, 2016.

[2]Based on TREKK.ca analytics. We collected baseline data for the period 16 weeks before the promotion.

[3]We aimed to increase the number of clicks to the TREKK Bottom Line Recommendations by 10% for the first week that we promoted it, and 5% for each additional week (i.e., 20% for three weeks of promotion).

[4]The Bottom Line Recommendation for procedural pain was published in October 2016, so we had no baseline data for this topic and did not include it in the calculation of the totals. We promoted the Bottom Line Recommendation for procedural pain for one week and it received 105 views over the promotion period.

Table 5. Altmetric scores and full text downloads for the promoted Cochrane systematic reviews

Week	Cochrane systematic review	Altmetric score, points				Full text downloads, N total		
		Baseline[1]	Goal[2]	Final	Point increase (%)	Baseline[3]	Final	Percent difference
1	Thromboprophylaxis for trauma patients	6	16	21	15 (250.0)	426	385	-9.5%
2	Surgical interventions for diaphyseal fractures of the radius and ulna in children	0	10	13	13 (130.0)	79	82	+4.1%
3	Prophylactic antibiotics for penetrating abdominal trauma	14	24	25	11 (78.6)	136	119	-12.7%
4	Nebulized epinephrine for croup in children	33	43	53	20 (60.6)	612	595	-2.8%
5	Selective computed tomography (CT) versus routine thoracoabdominal CT for high-energy blunt-trauma patients	0	10	10	10 (100.0)	128	149	+16.7%
6	Antibiotics for preventing infection in open limb fractures	4	14	18	14 (350.0)	263	252	-4.1%
7	Vaccines for preventing rotavirus diarrhoea: vaccines in use	36	46	54	18 (50.0)	406	386	-5.0%
8	Non-operative versus operative treatment for blunt pancreatic trauma in children	2	12	16	14 (700.0)	82	93	+14.1%
9	Antifibrinolytic drugs for acute traumatic injury	49	59	63	14 (28.6)	596	484	-18.8%
10	Oral versus intravenous rehydration for treating dehydration due to gastroenteritis in children	14	24	36	22 (157.1)	345	492	+42.6%
11[4]	Psychological interventions for needle-related procedural pain and distress in children and adolescents	-	-	109	-	910	999	+9.8%
12	Antiemetics for reducing vomiting related to acute gastroenteritis in children and adolescents	42	52	62	20 (47.6)	443	685	+54.6%
13	Emergency ultrasound-based algorithms for diagnosing blunt abdominal trauma	3	13	23	20 (666.7)	557	350	-37.2%
14	Glucocorticoids for croup	16	26	46	30 (187.5)	777	795	+2.3%
15	Interventions for treating femoral shaft fractures in children and adolescents	4	14	17	13 (325.0)	222	245	+10.4%
16	Heliox for croup in children	16	26	32	16 (100.0)	250	251	+0.2%
Mean ±SD		-	-	-	16.7 ±5.1 (215.4 ±214.0)	-	-	+4.0 (22.0)%

[1]Baseline altmetric.com scores were collected for each Cochrane systematic review on August 15, 2016.

[2]We aimed to increase the altmetric.com scores for each Cochrane systematic review that we promoted by 10 points.
[3]We calculated the average weekly downloads from the previous year (52 weeks), and multiplied this by 16 to obtain the average number of downloads for a 16 week period in the year prior to the promotion.
[4]We did not originally plan to promote this Cochrane systematic review, so we did not collect the baseline altmetric.com score. We replaced the systematic review that we originally planned to promote following a request from the knowledge products development team.

DISCUSSION

Using Twitter and blogs, we aimed to disseminate and promote the uptake of TREKK knowledge products and Cochrane systematic reviews on pediatric emergency medicine topics. Although our study design precludes inferring causation, during the campaign period we successfully increased the number of followers to the TREKK and Cochrane Child Health Twitter accounts by a respective 24% and 15%. We also observed increased traffic to the TREKK website, and a 22% increase in clicks to, and 59% increase in views of the TREKK BLRs. Although full text downloads of the Cochrane systematic reviews did not universally increase, the Altmetric scores increased by at least 10 points for each review. Despite not meeting our target views for the Cochrane Child Health blog, monthly traffic to the site was 1.5 times greater during the promotion compared to the previous eight months during which we had published no new posts.

Common barriers to the adherence to evidence-based guidelines in medical practice include inadequate knowledge of the guideline, attitudes (e.g., lack of motivation or self-efficacy), and behavioural factors (e.g., patient preferences, organisational constraints).[25] With respect to knowledge, especially for conditions where new evidence is accumulating quickly, keeping up with the latest guidance can be overwhelming or impossible.[10,26] Moreover, as not all published research is freely available,[27] the latest evidence may not be accessible by all HCPs. The rapid and continued growth of FOAM represents one important step toward reducing evidence-to-practice gaps in medicine by supporting free access to a dynamic collection of tools and resources for continuing education.[28] Just as HCPs are interested in keeping informed, author groups and organisations are seeking practical means to expand the visibility and uptake of their research and knowledge products. Our data suggest that targeted social media promotions can successfully drive traffic toward websites and products that support evidence-based practices.

Knowledge of the facets of effective social media messages will help to guide the planning and implementation of successful promotions. As many investigations of text-only tweets already exist,[20,29-31] our study is novel in that we committed to including custom images that supported the messages in all of our tweets. Ibrahim et al. (2017) designed a prospective, case-control crossover study whereby academic research articles were promoted using text-based tweets as well as tweets containing visual abstracts.[32] Compared to the text-based tweets, those that contained visual abstracts were retweeted 8.4 times more often ($p<0.001$) and received 7.7 times as many impressions ($p<0.001$).[32] Even when images are unrelated to the posted content, their simple presence can entice

users to read the accompanying tweet.[29] Nevertheless, real-life prospective evaluations comparing tweets of various content (e.g., text, images, videos) are few, so how to best structure a tweet aimed at disseminating knowledge products is not well known. Algorithms are being developed with the goal of predicting the popularity and lifespan of tweets.[33-35] These may provide some insight into the components of effective promotional messages.

Despite marked increases in Twitter followers and in views of our knowledge products, full text downloads of the Cochrane systematic reviews were comparable to baseline overall, and were less than baseline for some reviews. Because we did not have access to page view data, we relied on full text downloads to estimate the uptake (i.e., number of reads) of the reviews. However, Cochrane systematic reviews are long and their statistical findings can be difficult to understand.[36] Moreover, HCPs typically spend only two minutes pursuing answers to healthcare questions,[37] and when reading published research, many do not read the full text and some read only the abstract.[38] The addition of Summary of Findings tables (which summarise the findings of the reviews in a user-friendly format) to Cochrane systematic reviews reduced the time to answer clinical questions from 1.5 to 4.0 minutes to 1.3 to 2.1 minutes, and increased HCPs' and researchers' understanding of the key findings.[36] It is plausible in our study that our followers accessed only the abstract and Summary of Findings tables and did not download the full text.[39] Thoma et al. (2017) reported similar results for a social media promotion (tweets and podcasts) of research published in the Canadian Journal of Emergency Medicine, whereby Altmetric scores and abstract readership, but not full text readership, significantly increased.[39] Being concise and easy to understand, our knowledge products may also have been more appealing to busy HCPs compared to the Cochrane systematic reviews that informed them.

Despite the growing popularity of FOAM, one of the most common criticisms is that of quality control.[14,28] To the same degree that social media allow evidence-based materials to be widely and rapidly disseminated, misinformed messages and fallacious materials can also propagate quickly. The onus is mainly on the knowledge users to decipher the quality of online health information. A number of scoring tools have been developed to measure the quality of Internet-based resources for patients and clinicians,[40,41] but their use in practice is uncommon.[42] More often, individuals use visual cues to rapidly appraise the credibility of online sources, including reputation, endorsement, consistency, self-confirmation, expectancy violation, and persuasive intent.[42,43] Visual cues, however, are not always reliable indicators of credibility (e.g., "unpopular" tweets can contain credible content).[42] In our promotion, we included our logos (TREKK and Cochrane) on the tweeted images, cited full text materials

in our blog posts,[28] and tweeted from reputable accounts to establish credibility. It would be interesting in future studies to investigate how these visual cues of credibility impact the uptake of knowledge products disseminated on social media.

Implications for Research and Practice

A challenge for organisations who want to undertake evaluations of social media for knowledge dissemination in health is that, to our knowledge, no guidelines exist on: 1. how to set goals, 2. what is reasonable to achieve, 3. which social media metrics can or should be tracked, and 4. what should be considered "successful". In the absence of guidance, we developed specific goals based on historical measures of performance and decided on quantitative social media metrics to evaluate their achievement. As researchers whose expertise does not lie in media communications, we overlooked alternative measures of performance, e.g., Symplur analytics to measure the reach of a promotion-specific hashtag, which may have provided a better indication of the promotion's disseminative potential (as recommended by an expert peer reviewer). Because many organisations do not have specialised personnel devoted to managing social media profiles, practical guidance for undertaking effective and efficient evaluations of their promotions is needed.

Since we could not ascertain the contribution of our own social media activity to the increases in Almetric scores, we calculated how many of the total tweets for each review during the promotional period were our own (**Supplementary File 5**). These data, along with our Twitter analytics for the @TREKKca and @Cochrane_Child accounts, made it clear that our promotion performed better for some topics compared to others. For example, our own tweets made up far more of the total tweeting activity for the reviews on topics related to multisystem trauma, fractures, and intussusception compared to those on croup, procedural pain, and gastroenteritis. Our Twitter analytics also reflected greater user interaction with our tweets for the latter three topics. It is possible that reviews on croup, procedural pain, and gastroenteritis are more appealing to our followers. Reviews on these relatively common pediatric conditions may also appeal to a broader audience (e.g., parents, family medicine physicians). Our findings demonstrate the value in knowing one's followers and tailoring messages to their interests when planning a social media promotion.

The significance of communities of practice for knowledge sharing and professional development in social media has only begun to be investigated. Traditionally, communities of practice develop around the interests of their members, and provide a vehicle to share expertise in an area of practice.[44,45]

Communities of practice can improve patient care by fostering engagement, collaboration, learning, knowledge, and reflection.[46] Social media provide the opportunity to more easily and efficiently build networks of HCPs who share a common interest and desire to share their thoughts and experiences.[45] Developing new and leveraging existing networks may therefore be a promising approach to using social media to improve the uptake of knowledge products and inspire informed conversations and changes to practice.[45] Guidance for how to best develop and build online networks would be helpful to organisations wishing to move evidence into practice via the wide dissemination of knowledge tools.

An analysis of the #FOAMed online community of practice showed that it was organized around highly influential members who were responsible for 73% of all tweets.[47] On Twitter, these opinion leaders account for a small proportion of all users[48] but they can impact conversations substantially more than ordinary users.[48,49] Opinion leaders are likeable, trustworthy, educationally influential,[48,49] and highly credible,[50] and have greater social participation compared to their followers.[51] Users may become opinion leaders because they have a large cohort of followers, their followers themselves are highly influential, or they have a unique group of followers to help disseminate information.[52] In the context of our study, no member of our research team is considered an influencer of emergency medicine physicians.[52] Garnering the attention of opinion leaders, however, could be a promising strategy to optimizing the dissemination and uptake of social media messages. Conversely, in the hands of highly influential users it is also possible for superficial or inaccurate messages to be rapidly and widely disseminated.[52] Empirical evaluations of the behaviour of highly influential Twitter users may inform approaches to optimise the uptake of shared content.

CONCLUSIONS

There was increased traffic to TREKK knowledge products and Cochrane systematic reviews during our social media promotion. Social media represent an appealing means to disseminating and promoting health knowledge products, thanks to the potential for a broad reach. Nevertheless, it is not entirely clear how social media messages should be structured to optimize their uptake among broad audiences of followers. It is important that organisations measure and report on the impact of their social media efforts. The findings of well-planned evaluations will provide empiric evidence of their effectiveness and inform best practices for designing impactful social media messages.

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COMPETING INTERESTS STATEMENT

None declared.

AUTHORS' CONTRIBUTIONS

RF developed the protocol for the study, and AG, KS, SDS, and LH provided input. AG, RF, and KS developed the Tweets and blog posts. RF and KS collected the data. AG, RF, and KS analysed the data and AG drafted the manuscript. RF, KS, SDS, and LH critically revised the manuscript draft for important intellectual content. All authors agreed to be accountable for all aspects of the work and approved of the final version as submitted to the journal.

DATA SHARING STATEMENT

The data collected for this study are available from the corresponding author upon reasonable request.

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Fall 2016 Child Health Emergency Medicine Social Media Campaign
Project plan – Sept 2016

Supplementary File 1. A priori-protocol for the social media promotion

Summary:

We will run a 16 week social media promotion, titled the *Child Health Emergency Medicine Campaign*, using Twitter and blogs from September 5th to December 25th, 2016. Each week, we will publish a blog post on the Cochrane Child Health Wordpress site with a summary of a Cochrane systematic review on a pediatric emergency medicine (PEM) topic[1]. Our blog posts will also promote the Evidence Repository, Bottom line Recommendations (BLRs) and KT tools (eBooks, YouTube videos) from TRanslating Emergency Medicine for Kids (TREKK). 98 image-based Twitter messages (tweets) per week will share links to the blog post, the Cochrane review, and any applicable TREKK BLRs or KT tools.

Audiences:

The primary audience for our promotion will be PEM health professionals and trainees. A secondary audience, and the focus for promotion of TREKK KT tools, will be health consumers providing child care.

Our Social Media Team:

Team members from ARCHE and TREKK will have the following responsibilities:

Activity/Role	**Team members**
Create the social media plan	Robin, Kassi, Sandra, Allison
Approve the plan and the resources needed	Lisa, Denise, Michele, Lisa Knisley, Carly Leggett
Create the blog shots	Erin Hill
Compose the tweets	Kassi
Crete the blog posts	Allison
Approve content, schedule and post messages	Robin
Respond to comments	Erin (TREKK), Sandra (Cochrane Child), Robin (All)
Data collection	Robin
Reports creation	Robin, Kassi, Sandra, Allison

Goals:

Our goals for the promotion are to increase:

1. Twitter followers for @Cochrane_Child and @TREKKca
2. Downloads of TREKK BLRs
3. Altmetric.com scores for promoted Cochrane Systematic Reviews
4. Site visits to https://cochranechild.wordpress.com/
5. Site visits to www.trekk.ca
6. Views of TREKK KT tools

[1] We have received copyright permission from Cochrane and Wiley to reproduce the summaries on the blog site.

Fall 2016 Child Health Emergency Medicine Social Media Campaign
Project plan – Sept 2016

Objectives:

Target objectives are based on benchmark performance indicators established by the Cochrane Summaries promotion conducted in the fall of 2015.

1. Our promotion will increase followers for the @Cochrane_Child and @TREKKca Twitter accounts by 15%

Accounts	Baseline (Aug 15)	Goal (Dec 25)
@Cochrane_Child	1,934 followers	2,224 followers
@TREKKca	633 followers	728 followers

2. Our promotion will increase total clicks for the following TREKK BLRs[2] by 10% for the 1st promotional week, and then by 5% for each additional week (e.g., 20% for 3 weeks' promotion)

BLR	TREKK Report	Baseline (Aug 15)	Goal (Dec 25)	Promotional weeks
Fractures	http://trekk.ca/external_resources/1074	386	463	3
Intussusception	http://trekk.ca/external_resources/1159	150	165	1
Multisystem Trauma	http://trekk.ca/external_resources/850	157	212	6
Gastroenteritis	http://trekk.ca/external_resources/601	298	343	2
Croup	http://trekk.ca/external_resources/605	438	526	3

3. Our promotion will increase Altmetric.com scores for each Cochrane review by 10 points

Week	PEM Topic	Cochrane Review	Baseline (Aug 15)	Goal (Dec 25)
1: Sept 5-11	Multiple Trauma	Thromboprophylaxis for trauma patients	6	16
2: Sept 12-18	Fractures	Surgical interventions for diaphyseal fractures of the radius and ulna in children	0	10
3: Sept 19-25	Multiple Trauma	Prophylactic antibiotics for penetrating abdominal trauma	14	24
4: Sept 26-Oct 2	Croup	Nebulized epinephrine for croup in children	33	43
5: Oct 3-9	Multiple Trauma	Selective computed tomography (CT) versus routine thoracoabdominal CT for high-energy blunt-trauma patients	0	10
6: Oct 10-16	Fractures	Antibiotics for preventing infection in open limb fractures	4	14

[2] We will also promote the French language BLRs, but we will not collect usage data for these documents.

7: Oct 17-23	Intussusception	Vaccines for preventing rotavirus diarrhoea: vaccines in use	36	46
8: Oct 24-30	Multiple Trauma	Non-operative versus operative treatment for blunt pancreatic trauma in children	2	12
9: Oct 31-Nov 6	Multiple Trauma	Antifibrinolytic drugs for acute traumatic injury	49	59
10: Nov 7-13	Gastroenteritis	Oral versus intravenous rehydration for treating dehydration due to gastroenteritis in children	14	24
11: Nov 14-20	Chronic Pain	Psychological therapies for the management of chronic and recurrent pain in children and adolescents	76	86
12: Nov 21-27	Gastroenteritis	Antiemetics for reducing vomiting related to acute gastroenteritis in children and adolescents	42	52
13: Nov 28-Dec 4	Multiple Trauma	Emergency ultrasound-based algorithms for diagnosing blunt abdominal trauma	3	13
14: Dec 5-11	Croup	Glucocorticoids for croup	16	26
15: Dec 12-18	Fractures	Interventions for treating femoral shaft fractures in children and adolescents	4	14
16: Dec 19-25	Croup	Heliox for croup in children	16	26

4. Our promotion will increase 2016 overall site visits to https://cochranechild.wordpress.com/ to 6077[3] views

Year:	**2013**	**2014**	**2015**	**2016 (to date – Aug 15)**	**2016 (goal – by Dec 25)**
Views:	108	1192	7325	1453	6077
Posts Published:	3	9	26	0	16

5. Our promotion will increase overall monthly site visits to www.trekk.ca by 10%

Month:	**Baseline (Jul 2016)[4]**	**Baseline (Aug 2016)**	**Average for July/Aug**	**Goal (Sept 2016)**	**Goal (Oct 2016)**	**Goal (Nov 2016)**	**Goal (Dec 2016)**
Sessions:	1,292	1,464	1,378	1,516	1,516	1,516	1,516
Page Views:	3,419	5,865	4,642	5,106	5,106	5,106	5,106

[3] For the 35 total posts to the Cochrane Wordpress blog, there were 10,109 site visits. We calculated average views per post as 289. The site view goal for 2016 is based on an estimate of 289 views for each new post (16 x 289 = 4624) added to the 2016 baseline views of 1453.

[4] Revised Sept 26th 2016 based on revised data from TREKK Central Administration

Users:	856	930	893	982	982	982	982

6. Our promotion will increase views for previously published TREKK KT tools for croup by 10%, and by an equivalent of 10%[5] for newly published KT tools for gastroenteritis and chronic pain. We will coordinate our promotion to correspond with the CIHR IHDCYH Talks video competition for 2016: http://www.cihr-irsc.gc.ca/e/49305.html

PEM Topic	KT tool	URL	TREKK Report	Baseline (Aug 15)	Goal (Dec 25)
Croup	eBook	http://croup.trekk.ca/book/	http://trekk.ca/external_resources/1161	91 total clicks	100 clicks
	YouTube video	https://youtu.be/LJmCs4ykWHE	N/A	3682 views	4050 views
Gastro	eBook	TBD	TBD	N/A	100 clicks
	YouTube video	https://youtu.be/t3UkBk62AJE	N/A	N/A	368 views
Chronic Pain	YouTube video	TBD	TBD	N/A	368 views

Strategy:
Each week, we will reproduce a Cochrane summary as a post on https://cochranechild.wordpress.com/. Each post will also include:

- A blog shot image
- Citations and traceable links to TREKK KT tools & BLRs in English & French (if applicable)
- A citation and a traceable link to the Cochrane review
- A citation with a traceable link to the TREKK Evidence Repository (if applicable)

An initial post (see appendix) will be published during the week of August 29th, describing briefly the Child Health Emergency Medicine Campaign. Promoting tweets will accompany the introductory post.

We will promote the following reviews, BRLs and KT tools according to the schedule below:

Week	Topic	Review	BLR	KT tool	Note
1: Sept 5-11	Multiple Trauma	Thromboprophylaxis for trauma patients	Multisystem Trauma	None	
2: Sept 12-18	Fractures	Surgical interventions for diaphyseal fractures of the radius and ulna in children	Fractures	None	Lack of evidence
3: Sept 19-25	Multiple Trauma	Prophylactic antibiotics for penetrating abdominal trauma	Multisystem Trauma	None	Lack of evidence

[5] Based on the number of page views for the croup YouTube video and total clicks for the croup ebook.

Fall 2016 Child Health Emergency Medicine Social Media Campaign
Project plan – Sept 2016

4: Sept 26-Oct 2	Croup	Nebulized epinephrine for croup in children	Croup	- eBook - YouTube video	
5: Oct 3-9	Multiple Trauma	Selective computed tomography (CT) versus routine thoracoabdominal CT for high-energy blunt-trauma patients	Multisystem Trauma	None	Lack of evidence
6: Oct 10-16	Fractures	Antibiotics for preventing infection in open limb fractures	Fractures	None	
7: Oct 17-23	Intussusception	Vaccines for preventing rotavirus diarrhoea: vaccines in use	Intussusception	None	National Infection Control Week
8: Oct 24-30	Multiple Trauma	Non-operative versus operative treatment for blunt pancreatic trauma in children	Multisystem Trauma	None	Lack of evidence
9: Oct 31-Nov 6	Multiple Trauma	Antifibrinolytic drugs for acute traumatic injury	Multisystem Trauma	None	Canadian Intensive Care Week
10: Nov 7-13	Gastroenteritis	Oral versus intravenous rehydration for treating dehydration due to gastroenteritis in children	Gastroenteritis	- eBook - YouTube video	Video competition
11: Nov 14-20	Chronic pain	Psychological therapies for the management of chronic and recurrent pain in children and adolescents	None	- YouTube video	- National Child Day (Nov 20) - Video competition
12: Nov 21-27	Gastroenteritis	Antiemetics for reducing vomiting related to acute gastroenteritis in children and adolescents	Gastroenteritis	-ebook - YouTube video	Video competition
13: Nov 28-Dec 4	Multiple Trauma	Emergency ultrasound-based algorithms for diagnosing blunt abdominal trauma	Multisystem Trauma	None	Lack of evidence
14: Dec 5-11	Croup	Glucocorticoids for croup	Croup	- eBook - YouTube video	
15: Dec 12-18	Fractures	Interventions for treating femoral shaft fractures in children and adolescents	Fractures	None	
16: Dec 19-25	Croup	Heliox for croup in children	Croup	- eBook - YouTube video	

Twitter Promotion:
We will promote the blog post, its Cochrane review, the TREKK BLR and any applicable KT tool with tweets and re-tweets from @Cochrane_Child, @TREKKca, @arche4evidence, and @TripChildHealth

Account	Tweets will ink to:	Tweets per day	ReTweets per day	Total Tweets & Retweets per week	Total Tweets & ReTweets for the promotion
@Cochrane_Child	- Blog - Cochrane Review	3	3	42	672
@TREKKca	- Blog - TREKK products - Cochrane Review[6]	3	3	42	672
@arche4evidence	- Blog - TREKK products	0	1	7	112
@TRIPChildHealth	- Blog - TREKK products	0	1	7	112
	Totals:	**6**	**8**	**98**	**1568**

Scheduling:
We will use Buffer (https://buffer.com/) to identify peak traffic times and to schedule tweets for all Twitter accounts. We will write tweets in advance and pre-schedule every Monday morning for 16 weeks starting on September 5th. To help keep our project team on schedule, we will use a shared Google Calendar to list all project tasks and deadlines.

Blog shots & Images:
We will include images in all blog posts and Twitter messages. A maximum of 3 key messages from the Cochrane summaries will be integrated into the blog shots. See appendix for sample key messages. Images will be identified and modified from files supplied by Cochrane UK, ShutterStock, the TREKK KT tools project team, and other web sites containing public domain images (Wikimedia Commons, Flikr, Vecteezy, etc.). See appendix for an example blog shot and image-based tweet.

We will create 16 blog shots (1 per week) to be published on the blog and disseminated in at least one Twitter message per day. We will also create image-based tweets using the Pablo image editor through Buffer for tweets promoting Cochrane reviews. We will use TREKK-provided images to promote TREKK BLRs or TREKK KT tools. We will produce blog shots with black text on a light coloured background, using different coloured backgrounds for each topic area:

- Multiple trauma – Green
- Fractures – Grey
- Croup – Purple
- Intussusception – Orange
- Gastroenteritis – Blue

[6] We will tweet about the Cochrane Review when there is no BLR or KT tool to promote

As images for some topic areas (i.e., multiple trauma) may be inappropriate for our target audience of health consumers, we will use general emergency medicine images (e.g., ambulances, IV bags, ultrasound machines, x-rays, etc.) instead of images of injured children.

Audience Engagement

Initial Cochrane Author Contact:
We will contact lead authors and the Cochrane Review Groups responsible for the 16 selected reviews during the week of August 29th. We will share our intention to promote their review via social media, and provide the dates of the promotion. We will also invite them to check the @Cochrane_Child twitter account during the week of the review in order to re-tweet our promotional messages, and invite them to provide a quotation for the blog site. Please see a sample email message as an appendix below.

Initial TREKK Content Adviser Contact:
During the week of August 29th, we will also contact the TREKK content advisers who selected the promoted Cochrane reviews for their topic areas in the TREKK Evidence Repository, and who authored the promoted BLRs. We will share our intention to promote their selected Cochrane review and their BLR, and invite them to re-tweet our messages. They will also be invited to provide a quote, about why they selected the Cochrane review and the value of their BLR for health professionals. Please see a sample email as an appendix below.

Communication during the Promotion:
Twitter account moderators will reply promptly to messages about promoted content. Sandra or Robin will reply to comments about Cochrane content; Erin will reply to comments about TREKK content. Sandra, Erin and Robin will notify one another of comments needing moderation from re-tweeted content from the other's account.

Our replies will be positive, and aim to promote further engagement with Cochrane Child Health and TREKK. We will not dispense clinical information in our replies, but commit to sharing comments with our team. Below are anticipated scenarios for audience communication and sample responses:

Scenario	Description	Sample response
1. Spam	Advertisement as reply	Ignore, or block account (if it happens more than once).
2. Troll	Intentionally aggravating or offensive comments intended to elicit a response	Block account.
3. Praise	Comment in support of TREKK or Cochrane Child Health	Thanks and a link to more information (e.g., TREKK e-update sign up: http://trekk.ca/bulletins/1/subscriptions/new)

4. Complaint	Comment disagreeing with content	Thanks and a link for "how we select our evidence" (TREKK) or more information about the process of creating SRs (Cochrane)
5. Suggestion	Comment promoting research evidence that enhances/contradicts our messaging	Thanks and a statement that we'll pass their suggestion along to our team

Assessment:

We will use the following indicators and tools to assess each objective:

Objective	Indicator	Tool
1. Increase followers for the @Cochrane_Child and @TREKKca Twitter accounts by 15%	Number of followers	Twitter account information
2. Increase total clicks for the following TREKK BLRs by 10% for the 1st promotional week, and then by 5% for each additional week	- Click counts - Document views	- bit.ly reports - trekk.ca reports
3. Increase Altmetric.com scores for each Cochrane review by 10 points	- Altmetric.com scores	- Altmetric.com reports
4. Increase 2016 overall site visits to https://cochranechild.wordpress.com/ to 6077 views	Number of site visits	Wordpress account information
5. Increase overall monthly site visits to www.trekk.ca by 10%	Number of site visits	trekk.ca reports
6. Increase views for previously published TREKK KT tools for croup by 10%, and by an equivalent of 10% for newly published KT tools for gastroenteritis and chronic pain	- Click counts - Views	- bit.ly reports - trekk.ca reports

We will also collect "click count" data using @arche4evidence's bit.ly (https://bitly.com/) account for all blog posts, Cochrane reviews, and TREKK products promoted through Twitter and Wordpress. We will use Excel to record data once a week (30 days after the links are created). Click count data collection will start on October 5th and continue weekly until February 1st, 2017.

Knowledge Dissemination:

We will collect data in early February and prepare an internal report for our stakeholders at TREKK and Cochrane Child Health. Key findings from the report will be disseminated via a poster to be presented at Pediatric Research Day (May 2017) and WCHRI Research Day (Nov 2017). The poster will be adapted into an infographic and shared via Twitter between May and August 2017. A manuscript of the research findings will be submitted to an academic journal in 2018. Potential journals include: BMJ Open, JMIR, Health Communication, and the Journal of Health Communication.

Appendix: Introductory blog post

Sharing Research Knowledge through Social Media: the Fall 2016 Child Health Emergency Medicine Campaign

We are pleased to announce the Fall 2016 Child Health Emergency Medicine social media campaign. Building on a partnership between Cochrane Child Health and TRanslating Emergency Knowledge for Kids (TREKK), the 16-week campaign aims to promote the highest quality of health care for children and families by disseminating Cochrane evidence for pediatric emergency medicine.

Each week, we will share blog posts featuring plain language summaries of selected Cochrane systematic reviews, and associated TREKK evidence products suitable for families, health professionals and researchers. Our focus topics for this campaign include: fractures, intussusception, multisystem trauma, gastroenteritis, and croup.

Cochrane authors have collaborated globally to identify and synthesize evidence to answer pertinent questions about pediatric emergency medicine. Our aim is to expand the reach of these works by using social media as a platform to share their reviews. Be sure to check back each Monday from September 5th to December 19th for a new blog post. Also consider following our tweets from @Cochrane_Child and @TREKKca, and sharing the selected evidence products from www.trekk.ca

Appendix: Sample key messages

Week 1: **Thromboprophylaxis for trauma patients**

1. Unwanted blood clots (thromboembolism) are a frequent complication in people who have experienced physical trauma.
2. Evidence of the effectiveness of interventions to prevent thromboembolism (thromboprophylaxis) was reviewed in 16 studies involving 3,005 people.
3. Evidence supports the use of thromboprophylaxis to prevent clots in veins in lower extremities (deep vein thrombus) for people with severe trauma.

Appendix: Sample blog shot & image-based tweet

Appendix: Sample E-mail for Cochrane Corresponding Authors

Dear Dr. [insert],

This fall, Cochrane Child Health, in collaboration with Translating Emergency Knowledge for Kids (TREKK), will launch a 16-week social media campaign. The Child Health Emergency Medicine Campaign aims to promote highest quality health care for children and families by disseminating Cochrane evidence for pediatric emergency medicine. Our campaign includes weekly blog posts featuring the plain language summaries of selected Cochrane systematic reviews, and Twitter messages promoting those summaries and associated TREKK evidence products.

We are contacting you because your published Cochrane Review, "[insert title]" has been selected to be featured in our campaign. If you have a Twitter account, please consider promoting messages about your review from @Cochrane_Child during the week of [insert date].

Thank you for your valued contribution to the evidence-base in pediatric emergency medicine. We welcome your input to enhance our campaign, and would be delighted to incorporate a summary statement about your systematic review in our messages. Please respond to this email with your statement before [insert date], and we will include it in the campaign.

Kind Regards,

Appendix: Sample E-mail for TREKK Content Advisers

Dear Dr. [insert],

This fall, Translating Emergency Knowledge for Kids (TREKK), in collaboration with Cochrane Child Health, will launch a 16-week social media campaign. The Child Health Emergency Medicine Campaign aims to promote highest quality health care for children and families by disseminating TREKK and Cochrane evidence for pediatric emergency medicine. Our campaign includes weekly blog posts featuring the plain language summaries of Cochrane systematic reviews selected for topic areas in the TREKK Evidence Repository, and Twitter messages promoting those summaries and associated TREKK evidence products, including our Bottom line Recommendations (BLRs).

We are contacting you because your BLR, "[insert title]" and [this/these] Cochrane review/s from your topic area, "[insert title/s]" have been selected to be featured in our campaign. If you have a Twitter account, please consider promoting messages about the review and/or your BLR from @TREKKca or @Cochrane_Child during the week/s of [insert date/s].

We welcome your input to enhance our campaign, and would be delighted to incorporate a summary statement about the review and why you selected it for your TREKK topic area in the Evidence Repository, or about your BLR and its value for health professional. Please respond to this email with your statement before [insert date], and we will include it in the campaign.

Kind Regards,

Supplementary File 2. Sample blog shot images

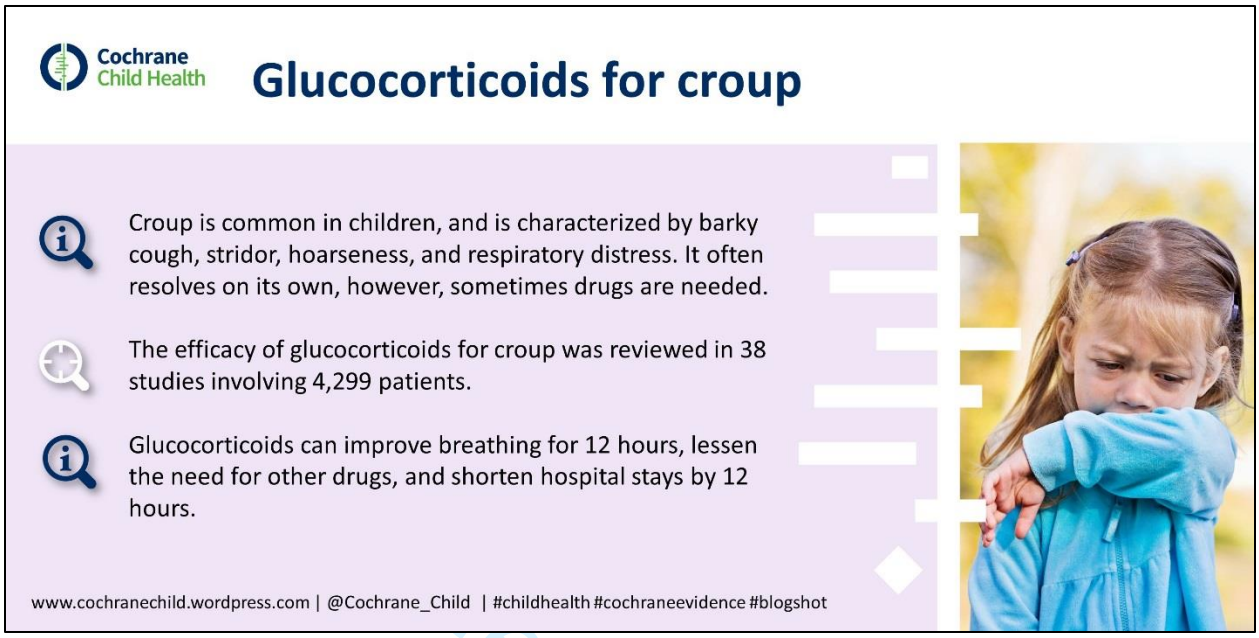

Figure 1. Sample blog shot image for croup

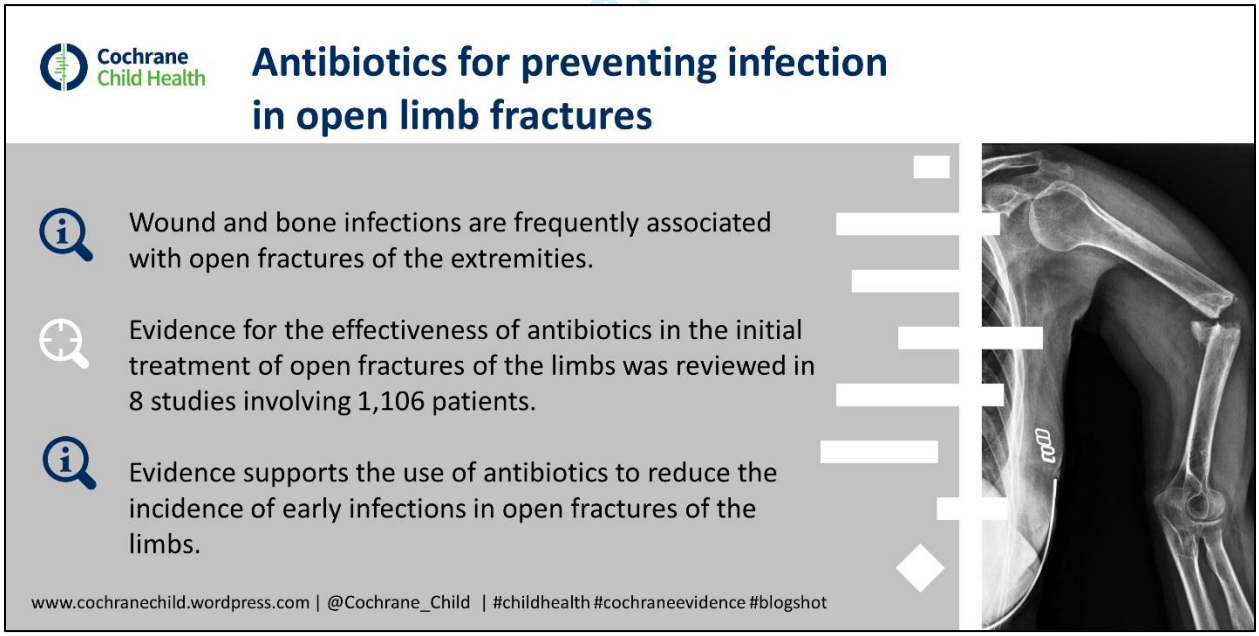

Figure 2. Sample blog shot image for fractures

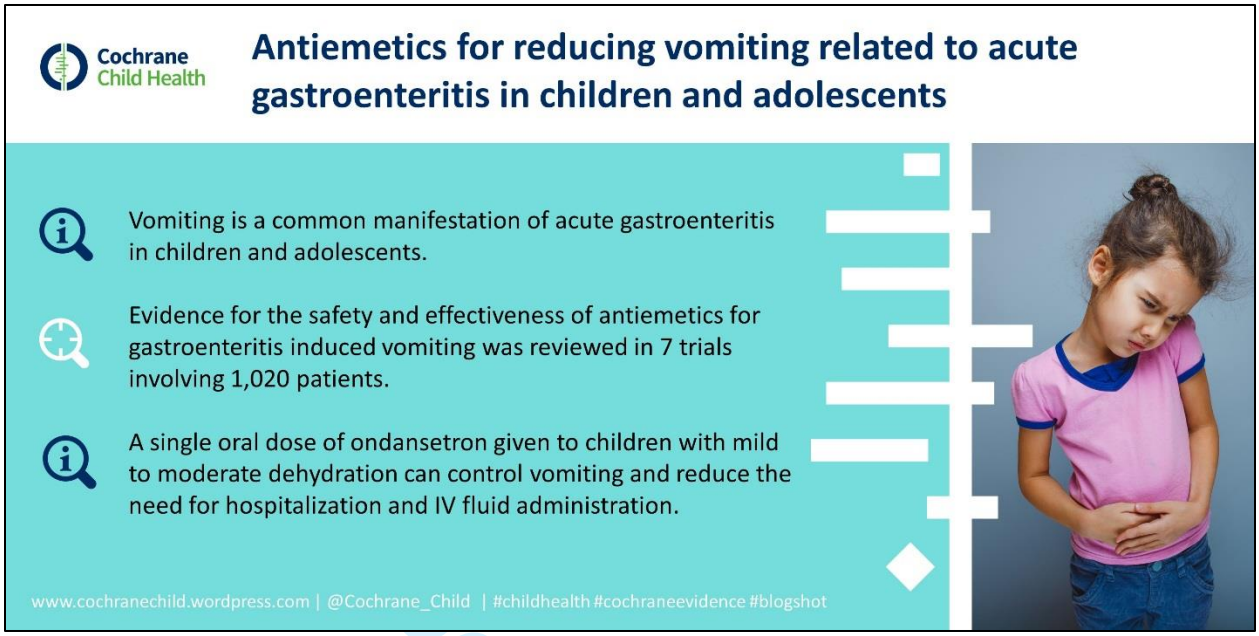

Figure 3. Sample blog shot image for gastroenteritis

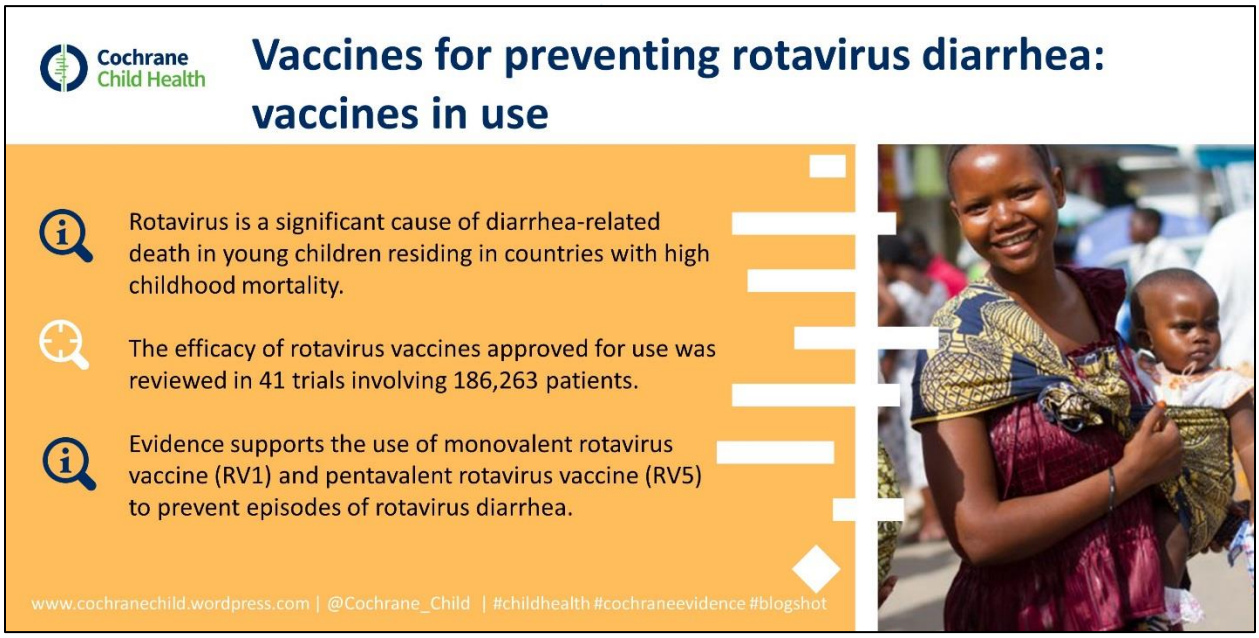

Figure 4. Sample blog shot image for intussusception

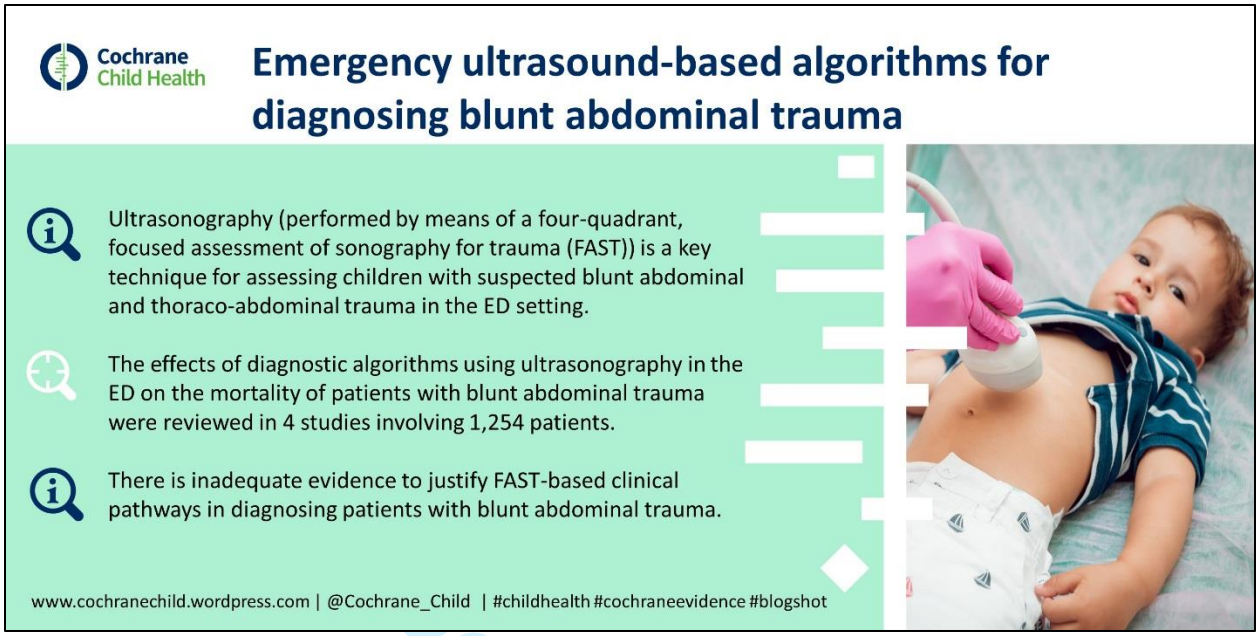

Figure 5. Sample blog shot image for multisystem trauma

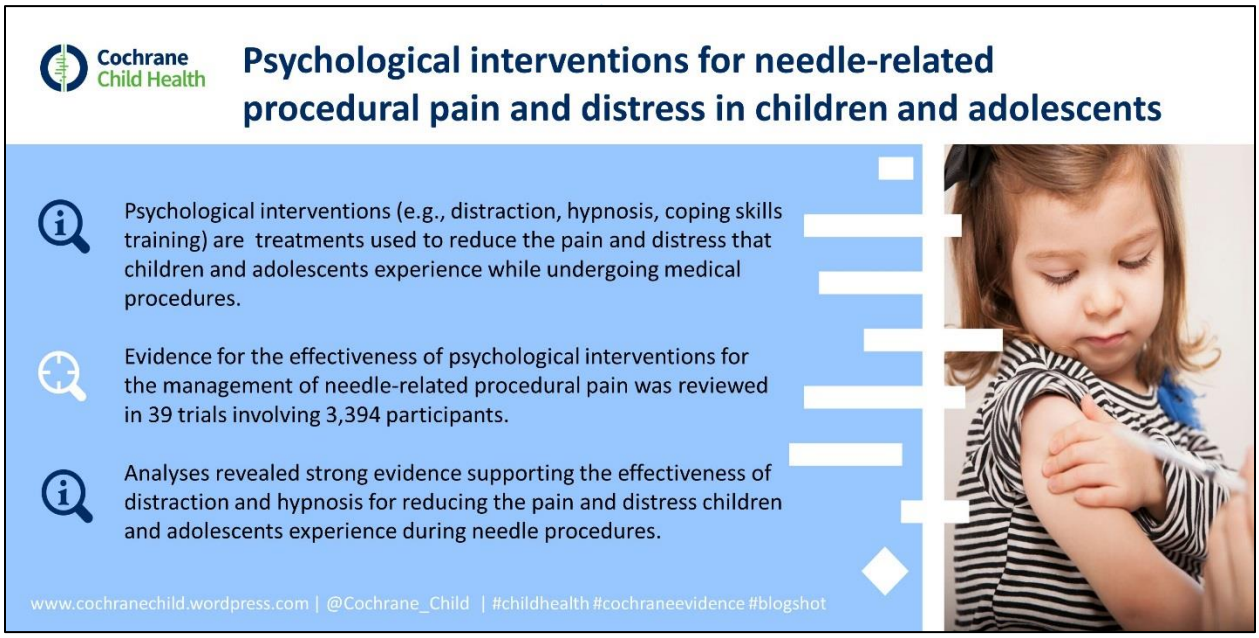

Figure 6. Sample blog shot image for procedural pain

Supplementary File 3. Sample image-based tweets promoting the Cochrane systematic reviews

Figure 1. Sample image-based tweet for croup

Figure 2. Sample image-based tweet for fractures

Figure 3. Sample image-based tweet for gastroenteritis

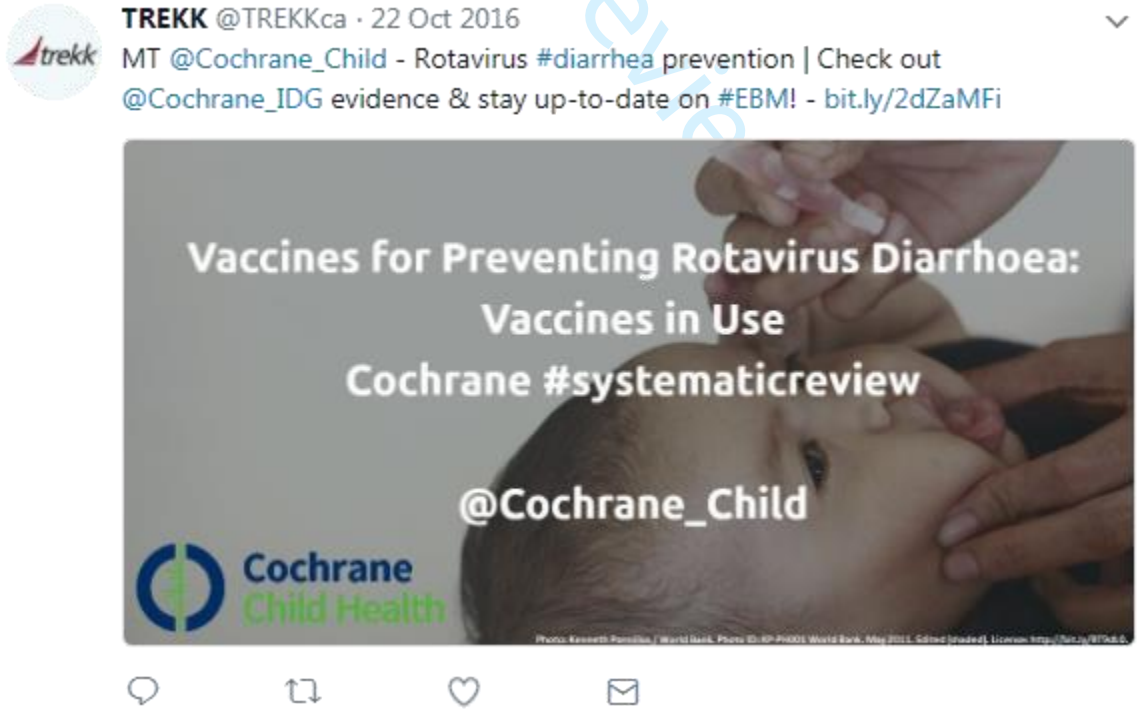

Figure 4. Sample image-based tweet for intussusception

Figure 5. Sample image-based tweet for multisystem trauma

Figure 6. Sample image-based tweet for procedural pain

Supplementary File 4. Weekly user interaction with the @TREKKca and @Cochrane_Child Twitter accounts

Week	Topic	@TREKKca, N				@Cochrane_Child, N			
		Retweets	Favourites	Impressions	Engagements	Retweets	Favourites	Impressions	Engagements
1	Multisystem Trauma	41	25	11,621	135	17	19	10,600	140
2	Fractures	28	23	11,600	324	40	37	17,014	389
3	Multisystem Trauma	27	27	8,450	281	15	13	11,777	154
4	Croup	60	39	14,059	293	104	59	24,106	658
5	Multisystem Trauma	23	21	9,503	145	17	14	10,255	156
6	Fractures	18	17	9,162	117	50	26	16,913	336
7	Intussusception	26	24	11,821	183	89	43	19,181	408
8	Multisystem Trauma	10	15	8,422	289	27	28	15,008	185
9	Multisystem Trauma	41	34	11,957	274	46	24	15,030	269
10	Gastroenteritis	53	40	15,122	362	68	44	17,331	497
11	Procedural Pain	44	42	17,230	420	109	74	23,756	622
12	Gastroenteritis	36	26	10,816	232	117	65	25,141	838
13	Multisystem Trauma	35	30	11,067	284	34	26	12,692	278
14	Croup	39	21	10,764	243	85	67	18,672	611
15	Fractures	41	26	12,498	218	35	31	18,245	261
16	Croup	47	36	17,982	380	41	23	17,452	302
Total		569	446	192,074	4,180	894	593	273,173	6,104
Mean ±SD per week		36 ±13	28 ±8	12,005 ±2,843	261 ±88	56 ±35	37 ±20	17,073 ±4,560	382 ±209

Supplementary File 5. Total tweets and tweets sent from our accounts for each Cochrane systematic review during the promotion

Cochrane systematic review	Total tweets, N[1]	Our tweets, N (% of total)[2]
Thromboprophylaxis for trauma patients	26	18 (69.2)
Surgical interventions for diaphyseal fractures of the radius and ulna in children	22	15 (68.2)
Prophylactic antibiotics for penetrating abdominal trauma	24	16 (66.7)
Nebulized epinephrine for croup in children	41	18 (43.9)
Selective computed tomography (CT) versus routine thoracoabdominal CT for high-energy blunt-trauma patients	17	16 (94.1)
Antibiotics for preventing infection in open limb fractures	27	16 (59.3)
Vaccines for preventing rotavirus diarrhoea: vaccines in use	28	17 (60.7)
Non-operative versus operative treatment for blunt pancreatic trauma in children	24	18 (75.0)
Antifibrinolytic drugs for acute traumatic injury	31	18 (58.1)
Oral versus intravenous rehydration for treating dehydration due to gastroenteritis in children	42	18 (42.9)
Psychological interventions for needle-related procedural pain and distress in children and adolescents	43	18 (41.9)
Antiemetics for reducing vomiting related to acute gastroenteritis in children and adolescents	39	18 (46.2)
Emergency ultrasound-based algorithms for diagnosing blunt abdominal trauma	26	18 (69.2)
Glucocorticoids for croup	38	18 (47.4)
Interventions for treating femoral shaft fractures in children and adolescents	27	18 (66.7)
Heliox for croup in children	29	16 (55.2)
Total	484	276 (57.0)
Mean ±SD	30 ±8	17 ±1

[1]During the period from September to December 2016.

[2]Tweets from @TREKKca, @Cochrane_Child, @arche4evidence, and @TRIPChildHealth

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	Page(s)
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	4-5
Objectives	3	State specific objectives, including any prespecified hypotheses	5
Methods			
Study design	4	Present key elements of study design early in the paper	5-9
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	5-10
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	n/a
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	9-10
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	9-10
Bias	9	Describe any efforts to address potential sources of bias	n/a
Study size	10	Explain how the study size was arrived at	n/a
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	10
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	10
		(*b*) Describe any methods used to examine subgroups and interactions	n/a
		(*c*) Explain how missing data were addressed	n/a
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	n/a
		(*e*) Describe any sensitivity analyses	n/a
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	n/a
		(b) Give reasons for non-participation at each stage	n/a
		(c) Consider use of a flow diagram	n/a
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	n/a
		(b) Indicate number of participants with missing data for each variable of interest	n/a
Outcome data	15*	Report numbers of outcome events or summary measures	9-15
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear	10-15

		which confounders were adjusted for and why they were included	
		(*b*) Report category boundaries when continuous variables were categorized	n/a
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	n/a
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	n/a
Discussion			
Key results	18	Summarise key results with reference to study objectives	16
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	3
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	16-18
Generalisability	21	Discuss the generalisability (external validity) of the study results	3
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	19-20